

National Commission for Indian System of Medicine (NCISM)

Text book of
**Agada Tantra evam
Vidhi Vaidyaka**

TOXICOLOGY

FORENSIC MEDICINE & MEDICAL JURISPRUDENCE

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Concepts of Agada Tantra (Clinical Toxicology)

Syllabus

1. Agada Tantra and Clinical Toxicology.
2. Scope of Agada Tantra.
3. Definition of Visha and poison, synonyms, Visha Guna, difference between Visha, Madya and Oja Guna, Visha Gati, Classification of Visha and poison, Sthavara and Jangama Visha Adhishtana.
4. Difference between poison, venom and toxin.
5. Routes of administration of poison.
6. Mode of action of Visha (Visha Gunanusara Karma) and poison (Introduction to toxicokinetics)
7. Factors modifying the action of poison.
8. Visha Vardhaka bhava and Visha Sankata
9. Vishavega, Vegantara and Sthavara Visha Veganusara Lakshana And Chikitsa.
10. Visha Peeta and Vishamukta Lakshana.

Learning objective

1. Define Agada Tantra and Toxicology. Describe the scope of Agada Tantra in the present era.
2. Define Visha and poison. Enlist its synonyms.
3. Differentiate between poison, venom and toxin.
4. Describe classification of Visha & poison
5. Describe Sthavara and Jangama Visha Adhisthana.
6. Describe the routes of administration of poison.
7. Enlist Visha Guna and differentiate between Visha, Madya and Oja Guna
8. Describe the mode of action of Visha (Visha Gunanusara Karma) & poison (Introduction to toxicokinetics).
9. Describe the factors modifying the action of poison.
10. Describe Vishavardhaka Bhava and Visha Sankata.
11. Describe Visha Vega & Vegantara
12. Describe Sthavara Visha Veganusara Lakshana and Chikitsa
13. Describe Vishapeeta and Vishamukta Lakshana.

Total - 9 hours (Lecture :08 hour, Non-lecture: 01 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- Yes

1. Agada Tantra and Clinical Toxicology

Agada Tantra is a branch of Ayurveda, the traditional system of medicine that originated in ancient India. In Ayurveda, "Agada" refers to toxic substances or poisons, and "Tantra" means a branch

of knowledge or a specific field of study. Therefore, Agada Tantra specifically deals with the diagnosis, treatment, and management of poisonings and toxicological conditions.

This branch of Ayurveda focuses on

understanding the nature of poisons, their effects on the human body, and the methods for detoxification and treatment. It involves the use of various herbs, minerals, and other natural substances to counteract the effects of toxins and promote healing. Agada Tantra is concerned with both acute poisonings and chronic toxic conditions and aims to provide solutions for a wide range of toxicological issues.

The word 'Agadatantra' is derived from the two words- Agada and Tantra.

Agada- अ (It is derived from अचूप्रत्यय) + गद (It is derived from गदप्रत्यय)

Agada means disease, discomfort, pain, poison or morbid conditions produced by any type of poison, absorbed, applied, injected or developed within the body.

अगदतंत्र निरुक्ति

अगद-नास्तिगदोयस्मात् (Which prevents disease or which relieves poison)

नास्तिगदोयस्य (Antidote to disease or poison)

तंत्र-शास्त्र/विज्ञान/science

अगद परिभाषा

अगदतन्त्रं नाम सर्पकीटलूतामूषिकादिदष्टविषव्यञ्जनार्थं विविधविषसंयोगोपशमनार्थं च ॥ (सु.सू. 1/14)

Agada Tantra is one of the eight branches of Ayurveda. It contains a complete description of the symptoms of poisoning caused by bites of snake, insects, rats, mice etc., and the relief, diagnosis and treatment of poisoning disorders affected by other various poisons as chemicals, synthetic compounds, etc.

अगदोविष प्रतिकारः, तदर्थतन्त्रंअगदतन्त्रं । (डल्हण)

Antidote (a medicine taken or given to counteract a particular poison) to poison is called Agada. This Tantra in which it is described is called Agada Tantra.

अगदतंत्र पर्याय

चरक	—	विषगरवैरोधिक प्रशमन
वाग्भट	—	दंष्ट्राचिकित्सा
कौटिल्य	—	जांगलि

अमरकोष — जाङ्गलिक

Poisoning: Poisoning is a harmful condition due to exposure to some chemical. It may be acute and chronic. Poisoning can affect one or a few individuals or even may affect the masses. Chemicals either natural or man-made causes potential harm to human beings are called Poison. It enters in our body through inhalation, ingestion or absorption through skin.

Derivation of word toxicology

“Toxical” means “an arrow” - a substance which causes death.

Definition of toxicology

It is a branch of medical science, which deals with poison in relation to their sources, properties, action, symptoms (which they produce), fatal dose, toxicity, diagnosis, treatment and autopsy features.

The toxicology is the study of Toxins (Poison) and their affects on living systems. Toxicology is a broad filled derived from Bio-chemistry, Pathology, Histology, Pharmacology and several other branches of medicine.

Clinical toxicology

It deals with causation, diagnosis and management of poisoning in humans.

Forensic toxicology

It is that branch of toxicology, which deals with the medical and legal aspects of the harmful effects of chemicals on humans.

2. Scope of Agada Tantra (अगदतंत्र प्रयोजन)

Agada Tantra primarily focuses on toxicology and the management of various types of toxins, including those derived from plants, animals, minerals, and other sources. The term “Agada” itself means antidote, which underscores the central role of this branch in understanding and treating poisoning and toxicity.

Two main scopes of Agada Tantra

1. Protection of healthy individuals from poisons.
2. Management of individuals afflicted with poisons.

Toxicology: Agada Tantra deals with the identification, classification, and treatment of various toxins, including those encountered in everyday life, such as venomous snake bites, insect stings, and plant-based poisons. It also includes the study of environmental toxins and pollutants.

Poisonous substances: Agada Tantra delves into the knowledge of various poisonous substances, their properties, and their effects on the human body. This includes toxins from plants, animals, minerals, and chemical sources.

Antidotes and treatments: This branch of Ayurveda provides insights into antidotes and treatment methods for poisoning cases. It covers herbal remedies, dietary modifications, purification techniques (Panchakarma), and other therapeutic approaches to counteract the effects of toxins.

Preventive measures: Agada Tantra emphasizes the importance of preventive measures to avoid poisoning. This includes guidelines for safe food and water consumption, living in a toxin-free environment, and understanding how to handle poisonous creatures and substances.

Research and development: Modern toxicology and pharmacology have evolved from the principles and practices found in Agada Tantra. Researchers often study traditional Ayurvedic texts and practices to discover potential new antidotes or treatments for toxins and poisons.

Public health: Ayurvedic toxicology, including Agada Tantra, contributes to public health by promoting awareness and education about potential sources of toxins and how to prevent and treat poisoning incidents.

Legal aspects: In some cases, Agada Tantra may be invoked to determine the cause of poisoning incidents, particularly in cases of criminal poisoning. It may involve the use of Ayurvedic toxicological principles in legal investigations.

Overall, Agada Tantra plays a crucial role in Ayurvedic medicine and contributes to the understanding and management of various toxic substances and poisoning incidents. Its scope extends to both preventive and therapeutic

measures, making it an important branch of traditional Indian medicine.

Reference of Agada Tantra in Samhita

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भैषज्यरत्नावली	विषरोग	-
चिकित्साकलिका	विषचिकित्सा	-

3. Definition of Visha and poison, synonyms, Visha Guna, difference between Visha, Madya and Oja Guna, Visha Gati, Classification of Visha and poison, Sthavara and Jangama Visha Adhishtana

Definition of Visha (विष निरुक्ति)

विषदजनत्वाच्चविषमित्यभिधीयते ।

Which causes Vishada (fear/grief/distress) is known as Visha.

विषमुच्यतेविषादनादहेतोः । (चक्रपाणि)

विषमिति विषादजननाद् ।

विषादो रोग जननानाम् ।

Which causes Vishada (fear) is known as Visha.

विष परिभाषा

देहं प्रविश्य यद् द्रव्यं दूषयित्वा रसादिकान् ॥

स्वास्थ्यप्राणहरं च स्यात् तद् द्रव्यं विषमुच्यते ॥

Visha is that substance which spread quickly as soon as it enters the body and contaminates the Rasadi Dhatu and causes diseases or death.

Visha is the poison which induces toxic symptoms in the body when consumed in unpurified form or improper quantity.

व्यवायि च विकाशि स्यात्सूक्ष्मं छेदी मदावहम् ।
आग्नेयं जीवितहरं योगवाहि स्मृतं विषम् ॥
(शा.सं.पू.खण्ड 4/22)

Sharangadhara Acharya explains the substance with the properties of व्यवायि, विकाशि, सूक्ष्म, छेदी, मदावहम्, आग्नेय, जीवितहरं and योगवाही called as Visha.

विषादजननत्वाच्च विषमित्यभिधीयते । (सु.क. 3/21)

The substance causes Vishada (depression) is called as Visha.

Definition of Poison

Derivation of Poison : The word poison is derived from the Latin word 'potus' means "to drink" - a drink that could harm or kill.

Definition of Poison : Any substance if, taken in any account, by any route, produces harmful effect (i.e. 3D - disease, deformity or death) called as poison.

Poisons are substances that can cause death, injury or harm to organs, tissues, cells and DNA usually by chemical reactions and other activity on molecular scales, when exposed in a sufficient quantity.

Visha Synonyms (विष पर्याय)

Kshveda, Garala, Gara, Gada, Kalakuta, Rasa, Tikshna, Jivitapaham, Mugara, Amrita, Vatsanabha, Shringika, Sourastrika, Pradipana, Saktuka, Brahmaputra, Mustaka.

Visha Guna (properties of poison)

According Charaka and Sushruta acharya explains ten Guna -

लघु रुक्षमाशु विशदं व्यवायि तीक्ष्णं विकाशि सूक्ष्मं च ।
उष्णमनिर्देश्यरसं दशगुणमुक्तं विषं तज्ज्ञैः ॥
(च.चि. 23/24)

रूक्षमुष्णं तथा तीक्ष्णं सूक्ष्ममाशु व्यवायि च ।
विकारी विरादं चैव लघ्वपाकि च तत् स्मृतम् ॥
(सु.क. 2/18-19)

- | | |
|------------|--|
| 1. लघु | 2. रूक्ष |
| 3. आशु | 4. विशद |
| 5. व्यवायी | 6. तीक्ष्ण |
| 7. विकासी | 8. सूक्ष्म |
| 9. उष्ण | 10. अनिर्देश्य रस/ अव्यक्त रस/ अविपाकि |

वृद्धवाग्भट explains अपाकी and अनिर्देश्य रस गुण. It means वृद्धवाग्भट explains eleven Guna.

Sharangadhara Acharya explains eight Guna.

व्यवायि च विकाशि स्यात्सूक्ष्मं छेदी मदावहम् ।
आग्नेयं जीवितहरं योगवाहि स्मृतं विषम् ॥
(शा.सं.पू.खण्ड 4/22)

- | | |
|------------|-------------|
| 1. व्यवायी | 5. मद |
| 2. विकाशि | 6. आग्नेय |
| 3. सूक्ष्म | 7. जीवितहरं |
| 4. छेदी | 8. योगवाही |

Visha Guna Prabhava (its effect on body)

रौक्ष्याद्वातमशैत्यात्पित्तं सौक्ष्म्यादसृक् प्रकोपयति ।
कफम् व्यक्तरसत्वादन्नरसांश्चानुवर्तते शीघ्रम् ॥
शीघ्रं व्यवायिभावादाशु व्याप्नोति केवलं देहम् ।
तीक्ष्णत्वान्मर्मघ्नं प्राणघ्नं तद्विकासित्वात् ॥
दुरुपक्रमं लघुत्वाद्वैशद्यात् स्यादसक्तगतिदोषम् ।
दोषस्थानप्रकृतीः प्राप्यान्यतमं ह्युदीरयति ॥

(च.चि. 23/25-27)

- Because of Ruksha (dryness property), Vayu gets aggravated,
- Due to Ushna (hot property), Pitta gets vitiated.
- Sukshma Guna- leads to vitiation of Rakta
- Due to Avyakta Rasa (indistinct taste)- Kapha get vitiated.
- Due to Ashu Guna (rapidly acting), it quickly permeates through the nutrient fluid.
- Vyavayi Guna spreads it throughout the body instantaneously.
- Tikshna guna (sharply acting) property causes injury to Marmas.
- Vikashi Guna results in causing Marmaghata and discomfort.
- Due to Laghu Guna it becomes difficult to manage therapeutically.
- Because of Vaishadya Guna, it pervades all over the body with Dosha without any obstruction in circulation.

Depending upon the location of Dosha and

Prakruti of patient, Visha produces several other complications.

Difference between Visha, Madya and Oja Guna

विष गुण-

लघु रुक्षमाशु विशदं व्यवायि तीक्ष्णं विकासि सूक्ष्मं च ।
उष्णमनिर्देश्यरसं दशगुणमुक्तं विषं तज्ज्ञैः ॥

(च.चि. 23/24)

ओज गुण- गुरु शीतं मृदु श्लक्ष्णं बहलं मधुरं स्थिरम् ।

प्रसन्नं पिच्छिलं स्निग्धमोजो दशगुणं स्मृतम् ॥

(च.चि. 24/31)

मद्य गुण- लघूष्णतीक्ष्मसूक्ष्माम्लव्यवाय्याशुगमेव च ।

रूक्षं विकाशि विशदं मद्यं दशगुणं स्मृतम् ॥

(च.चि. 24/30)

ओज गुण	विष गुण	मद्य गुण
गुरु	लघु	लघु
स्निग्ध	रूक्ष	रूक्ष
शीत	उष्ण	उष्ण
मृदु	तीक्ष्ण	तीक्ष्ण
बहल (सान्द्र)	सूक्ष्म	सूक्ष्म
प्रसाद	आशु	आशु
स्थिर	व्यवायी	व्यवायी
श्लक्ष्ण	विकाशि	विकाशि
पिच्छिल	विशद	विशद
मधुर	अनिर्देश्य रस	अम्ल

Due to having opposite properties, Visha destroys the properties equivalent to Ojas, complete destruction of energy would be cause of death. Madya has less properties than Visha. Therefore, Madya has similar effects to Visha but has less side effect on the body.

व्याप्यैवं सकलं देहमुपरुध्य च वाहिनीः ।

विषं विषमिव क्षिप्रं प्राणानस्य निरसति ॥

(अ.सं.उ. 40/25)

The poison spread throughout the body takes away life by blocking the path of Sira, Dhamani, Srotas etc.

Visha Gati (विष गति)

जाङ्गमं स्यादधोभागमूर्ध्वभागं तु मूलजम् ।

तस्मादंष्ट्राविषं मौलं हन्ति मौलं च दंष्ट्रिजम् ॥

(च.चि. 23/17)

The Jangama Visha (animal poison) moves Adhobhaga (downwards) whereas the Sthavara Visha (vegetable poison) moves Urdhwa Bhaga (upwards) in the alimentary canal. Therefore, the Jangama Visha (animal poison) cures by Sthavara Visha (vegetable poison) and the poisoning caused by Sthavara Visha (vegetable poison) cures by Jangama Visha (animal poison).

जंगम विष - ऊर्ध्वगति स्थावर विष - अधोगति

Classification of Visha and Poison (विष वर्गीकरण)

स्थावरं जङ्गमं चैव द्विविधं विषमुच्यते ।
दशाधिष्ठानमाद्यं तु द्वितीयं षोडशाश्रयम् ॥

(सु.क. 2/3)

जङ्गमस्थावरायां तद्योनौ ब्रह्मा न्ययोजयत् ।
तदम्बुसंभवं तस्माद्विविधं पावकोपमम् ॥

(च.चि. 23/6)

स्थावरं जङ्गमं चैति विषं प्रोक्तमकृत्रिमम् ।
कृत्रिमं गरसंज्ञं तु क्रियते विधौषधैः ॥

(अ.ह.उ. 35/5)

चरक and सुश्रुत- स्थावर and जाङ्गम

वाग्भट- स्थावर, जांगम and कृत्रिम

काश्यप- स्थावर

वानस्पतिक

जंगम

खनिज

कृत्रिम/संयोगज

गरविष

दूषीविष

Jangama Visha (Animal origin poisons)

सर्पाःकीटोन्दुरा लूता वृश्चिका गृहगोधिकाः ।

जलौकामत्स्यमण्डूकाः कणभाः कृकलासकाः ॥

श्वसिंहव्याघ्रगोमायुतरक्षुनकुलादयः ।

दंष्ट्रिणो ये विषं तेषां दंष्ट्रोत्थं जङ्गमं मतम् ॥

(च.चि. 23/9-10)

Jangama Visha (animal origin poisons) are Sarpa (snakes), Kita (insects), Luta (spiders), Vrushchika (scorpions), Griha Godhika (house lizards), Jalauka (leeches), Matsya (fish), Manduka (frogs), Kanabha or Salabha (locusts), Krukantaka (chameleon), Shwa (dogs), Simha (lion), Vyaghra

(tiger), Gomayu (jack), Taraksu (hyena), Nakula (mongoose) etc. are the fanged animals through whose fangs the poison is transmitted.

Sthavara Visha (Earthen and plant origin poisons)

मुस्तकं पौष्करं क्रोञ्चं वत्सनाभं बलाहकम् ।
कर्कटं कालकूटं च करवीरकसंज्ञकम् ॥
पालकेन्द्रायुधं तैलं मेघकं कुशपुष्पकम् ।
रोहिषं पुण्डरीकं च लाङ्गलक्यञ्जनाभकम् ॥
संज्ञोचं मर्कटं शृङ्गीविषं हालाहलं तथा ।
एवमादीनि चान्यानि मूलजानि स्थिराणि च ॥
(च.चि. 23/11-13)

The poisons of the Stirani (immobile earthen and plant) origin are the roots (including rhizomes) of Mustaka, Paushkara, Krauncha, Vatsanabha, Balahaka, Karkata, Kalakuta, Karavira, Palaka, Indrayudha Taila, Meghaka, Kusha Pushpaka, Rohisha, Pundarika, Langalaki, Anjanabhaka, Sankoca, Markata, Sringi Visha, Halahala and other such poisonous roots.

Gara Visha (artificial poison)

गरसंयोगजं चान्यद्गरसंज्ञं गदप्रदम् ।
कालान्तरविपाकित्वान्न तदाशु हरत्यसून् ॥
(च.चि. 23/14)

There is another variety of poison called Gara Visha which is prepared artificially by the combination of various substances. It produces various diseases. Since it takes time to get metabolized and to produce its toxic effects, it does not cause instantaneous death of a person.

दूषीविषं तु शोणितदुष्ट्यारुःकिटिभकोठलिङ्गं च ।
विषमेकैकं दोषं संदूष्य हरत्यसूनेवम् ॥
(च.चि. 23/31)

Dushi Visha (a type of artificial poison) vitiates Shonita (blood) and produces symptoms like Aru (eczema in the head), Kitibha (psoriasis) and Kotha (urticaria). This type of poison afflicts each one of the Dosha and causes death of the patient.

विष भेद (Types of poison)

हालाहलः कालकूटः शृङ्गकश्च प्रदीपनः ।
सौराष्ट्रिको ब्रह्मपुत्रो हारिद्रः सत्तुकस्तथा ॥

वत्सनाभ इति ज्ञेया विषभेदा अमो नव ।
रसे रसायनादौ च वत्सनाभः प्रशस्यते ॥
(र.त. 24/7-8)

- | | | |
|----------------|----------------|-------------------|
| 1. हालाहल | 2. कालकूट | |
| 3. शृङ्गक | 4. प्रदीपन | $5^3 H^2 K B P V$ |
| 5. सौराष्ट्रिक | 6. ब्रह्मपुत्र | |
| 7. हारिद्रक | 8. शत्तुक | 9. वत्सनाभ |

उपविष भेद

विषतुन्दिकबीजं च त्वहिफेनश्च रेचकम् ।
धत्तूरबीजं विजया गुञ्जा भल्लातकाह्वयः ॥
अर्कक्षीरं स्नुहीक्षीरं लाङ्गली करवीरकम् ।
समाध्यातो गणोऽयं तु बुधैरुपविषाभिधः ॥
VARAD SV BKL G (र.त. 24/163-164)

- | | |
|-------------------|----------------|
| 1. विषतिन्दुक बीज | 7. भल्लातक |
| 2. अहिफेन | 8. अर्कक्षीर |
| 3. रेचक | 9. स्नुहीक्षीर |
| 4. धत्तूरबीजं | 10. लांगली |
| 5. विजया | 11. करवीर |
| 6. गुञ्जा | |

Classification of Poison

A. On the basis of structure

1. Corrosive

a. Strong acids

- Mineral or inorganic acids, e.g. H_2SO_4 , HCl.
- Organic acids, e.g. carbolic, acetic, oxalic acid.

b. Strong alkalis, e.g. sodium hydroxide.

c. Metals, e.g. arsenic, mercury, lead, Cu, Zn, Sn.

2. Irritants

a. Inorganic

- Non-metal, e.g. phosphorus, iodine
- Metal, e.g. arsenic, lead etc.

b. Organic

- Animal, e.g. snake, scorpion
- Plant or vegetable, e.g. castor, calatropis etc.

c. **Mechanical**, e.g. chopped hair, metal pieces etc.

3. Systemic

a. Cerebral poisons

- Somniferous • Inebriants
- Stimulants • Deliriant
- Depressant • Psychotropics

b. Spinal poisons, e.g. strychnine

c. Peripheral nerve poison, e.g. curare

d. Cardiac poison, e.g. aconite

e. Asphyxiants, e.g. carbon monoxide

f. Nephrotoxic, e.g. mercury

g. Hepatotoxic, e.g. phosphorus

h. Others, e.g. food poisoning

B. Based on purpose of use

1. Homicidal poisons : Organophosphate, arsenic etc.
2. Suicidal poisons : Benzodiazepines, Opoids, barbiturates, organophosphorus cannabis etc.
3. Accidental poisons : Unintended, undesigned and unexpected happening - ex. CO, household cleaning agents, pesticides etc.
4. Abortifaciant poisons : Used for abortion, e.g. ergot, calotropis, plumbago
5. Stupefying poisons : e.g.. Dhatura, Cannabis, Chloral etc.
6. Cattle poisons : e.g.. Abrus, Calotropis, Plumbago
7. Arrow poisons : e.g. Strychnos toxifera, Nerium, Sciadotenia toxifera etc.
8. Use to fabricate injury or malingering
9. Use to cause injury
10. Use for torture

C. Based on Source of Poison

1. Domestic or house-hold poisons
2. Agricultural poisons
3. Environmental poisons
4. Industrial poisons
5. Food and drinks poisons
6. Drugs and medicines

Visha Yoni (Sources of poison)

जङ्गमस्थावरायां तद्योनौ ब्रह्मा न्ययोजयत् ।

(च.चि. 23/6)

Lord Brahma segregated these Visha in two categories Jangama (animal origin) and Sthavara (earthen and plant origin).

Sthavara and Jangama Visha Adhishtana

Sthavara Visha Adhishtana

मूलं पत्रं फलं पुष्पं त्वक् क्षीरं सार एव च निर्यासो धातवश्चैव कन्दश्च दशमः स्मृतः । (सु.क.अ.2)

Pushpa (Flower)	Beeja (Seeds)
Phala (Fruit)	Kanda (Stem)
Patra (Leave)	Sara (Essence)
Moola (Root)	Niryasa / Ksheera (Exudate / Latex)
Tvak (Bark)	Khanija (Metals / Minerals)

अधिष्ठान	विष संख्या	स्थावर विष नाम
मूल	8	क्लीतक, कनेर, गुञ्जा, सुगन्ध, गर्गरक, करघाट, विद्युच्छिखा, विजया
पत्र	5	विषपत्रिका, लम्बा, वरदारु, करम्भ, महाकरम्भ
फल	12	कुमुद्वती, वेणुका, करम्भ, महाकरम्भ, कर्कोटक, रेणुक, खद्योतक, चर्मरी, इभगन्धा, सर्पघाती, नन्दन, सारपाक
पुष्प	5	वेत्र, कादम्ब, बल्लीज, करम्भ, महाकरम्भ
त्वक, सार	7	अन्नपाचक, कर्तरीय, सौरीयक, करघाट, करम्भ, नन्दन, नाराचक and निर्यास
क्षीर	3	कुमुदघ्नी, स्नुही, जालक्षीरी
धातु	2	फेनाशम, हरताल
कंद	13	कालकूट, वत्सनाभ, सर्षप, पालक, कर्दमक, वैराटक, मुस्तक, शृङ्गीविष, प्रपुण्डरीक, मूलक, हालाहल, महाविष, कर्कोटक

Jangama Visha Adhishtana

जङ्गमस्य विषस्योक्तान्यधिष्ठानानि षोडश तत्र दृष्टिदंष्ट्रानिःश्वासनखमूत्रपुरीष शुक्रलालार्तवमुखसन्दंश-विशार्धित गुदास्थिपित्तशूकशवानि । (सु.क.अ.3)

1. Nishvasa (Exhalation)
2. Damstra (Teeth/Tusk)
3. Nakha (Claws)
4. Mutra (Urine)
5. Purisha (Faeces)
6. Shukra (Semen)
7. Lala (Saliva)
8. Artava (Menstrual blood)
9. Mukha (Mouth)
10. Sandamsha (Proboscis/Pincers)
11. Vishardhita (Flatus)
12. Tunda (Beak)
13. Asthi (Bones)
14. Pitta (Bile)
15. Shuka (Bristles/Hair)
16. Shava (Cadaver)

संख्या	विष अधिष्ठान	जंगम प्राणि
1.	दृष्टि	दिव्य सर्प
2.	निःश्वास	भूमि सर्प
3.	दंष्ट्रा	भौम सर्प, मार्जार, अश्वानर, मकर, मण्डुक, मत्स्य, गोधा, शम्बूक, प्रचालक, गृहगोधिका, चतुष्पादकीट
4.	नख	मार्जार, अश्वानर, मकर, मण्डुक, मत्स्य, गोधा, शम्बूक, प्रचालक, गृहगोधिका, चतुष्पादकीट, लूता
5.	मूत्र	कीट, चिपिट, सर्षपक, वर्च
6.	पुरीष	कीट, चिपिट, सर्षपक, वर्च
7.	शुक्र	मूषक, लूता
8.	लालास्राव	लूता
9.	आर्तव	लूता
10.	मुख	लूता, चित्रशिर, सराव, कुर्दि, अरिमेदक, मक्षिक, कणभ, जोंक
11.	सदंश	लूता, चित्रशिर, सराव, कुर्दि, अरिमेदक,
12.	विशर्धित (गुद)	चित्रशिर, सराव,
13.	तुण्डास्थि	वरटी, शतपदी, शृंगी, भ्रमर, उच्चिटिंग
14.	शूक	वरटी, शतपदी, शृंगी, भ्रमर, उच्चिटिंग
15.	पित्त	शकुली मत्स्य, वरकी मत्स्य, रक्तराजी मृतकीट, सर्प

4. Difference between Poison, Venom and Toxin

Toxins are substances created by plants and animals that are poisonous to humans. Toxins may also include some medicine that are helpful in small doses, but poisonous in large amounts.

Poison is a toxin that gets into the body by inhaling, swallowing or absorption through the skin.

Venoms are produced by many groups of animals from coelenterates to vertebrates. While toxins and venoms are the primary toxicological concern in natural ecosystems, they are frequently of importance in agroecosystems and in military deployments.

Venom	Poison
Enters the body through bites and stings.	Enters into the body by swallowing, inhaling, or absorption through the skin.
It is secreted by the fangs, teeth, or spiny protrusions on the body.	It is secreted by the skin.
It is introduced into an organism through a bite or a sting.	It is secreted as a result of being touched, disturbed, or eaten.
Venom is used primarily to kill or stun prey.	Poison is secreted to deter a potential predator
The cobra is an example of a venomous animal.	The Dart frog is an example of a poisonous animal.

5. Routes of Administration of Poison

A. Local route

1. Dermal
2. Ocular
3. Nasal
4. Vaginal
5. Rectal
6. Urethral

B. Systemic route

1. **Oral** - Most commonly used method, being safe, convenient and painless, action is slow and passes through portal circulation.
2. **Sublingual** - Beneath the tongue or crushed in mouth and spread over the buccal mucosa,

rapid absorption and directly passes into the systemic circulation.

3. **Rectal** - Useful in patients having nausea and vomiting, poison is absorbed from the external haemorrhoidal veins.
4. **Inhalational** - Poison used in vaporised form or spray and absorbed by mucous membrane of trachea and lungs, faster absorption and quick action.

5. Parenteral - Routes other than enteral.

Example

- Intravenous (enters direct in systemic circulation)
- Intramuscular
- Subcutaneous (Injected under the skin, slower absorption for a longer period eg. Depot injections)
- Intradermal (in outer layer of skin) etc.

6. Mode of action of Visha (Visha Gunanusara Karma) and Poison (Introduction to Toxicokinetics)

विष गुणानुसार कर्म (पंचभौतिकत्व and दोषकर्म)

क्र.	गुण	पंचभौतिक संगठन	दोषकर्म	कर्म
1.	लघु	अग्नि+वायु+आकाश	कफवृद्धिकर, वातघ्न	लंघन
2.	रूक्ष	अग्नि+वायु+पृथ्वी	वातवृद्धिकर, कफघ्न	शोषण
3.	उष्ण	अग्नि	पित्तवृद्धिकर, वातकफघ्न	स्वेदन
4.	तीक्ष्ण	अग्नि	पित्तवृद्धिकर, कफघ्न	शोधन
5.	सूक्ष्म	अग्नि+वायु+आकाश	वातवृद्धिकर	विवरण
6.	विशद	Except जल	वातवृद्धिकर	क्षालन

Sl. No.	Visha Guna	Visha Karma
1.	Laghu	Duchikitsya (difficult to treat)
2.	Ruksha	Vata Prakopaka, Jadyata, Duchikitsya, Stambhana, Bala Varnahani
3.	Ashu / Ashukari (quick acting and destructive)	Destroys the tissues quickly
4.	Vishada	Does not adhere to any place
5.	Vyavayi (pervading)	Spreads within the whole body quickly; before undergoing digestion
6.	Tikshna	Causes Moha (delusion) and breaks Marma-Bhanda (support of vital organs)
7.	Vikashi (slackening)	Slows and destroys functioning of Dosha, Dhatu and Mala
8.	Sukshma	Enters into all the organs at the minute level and causes abnormalities
9.	Ushna	Pitta and Rakta Prakopaka, Trishna, Daha, Swedajanana
10.	Anirdesha / Avyakta Rasa (indistinct taste) / Avipaki (indigestible)	Not perceivable due to indistinctive taste / Difficult to expel due to indigestibility

Toxicokinetics

Toxicokinetics is the study of absorption, distribution, biotransformation and excretion of toxicants (Poison). It describes the systemic exposure of poison.

i) Absorption and distribution

- Absorption means the movement of the poison into the blood stream from its site of administration or entry. This is followed by distribution, i.e. movement of molecules of the poison from the blood into the tissues.

ii) Biotransformation

- Biotransformation means enzyme-catalysed chemical transformation of poison within the living organism. The metabolites thus formed are much less lipid soluble, hence not re-absorbed from the renal tubules and thus are finally excreted.

iii) Action of Poison

1. **Local action:** act at the site of application, eg. conc. sulphuric acid on skin produces chemical burns.
2. **Systemic action:** act on specific system, eg. aconite act on heart and causes cardiac toxicity and death.
3. **Combined action:** act both locally as well systemic, eg. carbolic acid locally act as corrosive when applied to skin but when ingested acts as systemic poison.

iv) Routes of excretion or elimination

Either in unchanged form or as water-soluble metabolites.

A. Major route of elimination

1. Urine
2. Faeces
3. Exhaled air
4. Bile

B. Minor route of elimination

1. Saliva
2. Sweat
3. Milk
4. Hair
5. Skin

7. Factors Modifying the Action of Poison

1. **Route of administration** - Gaseous mode is fastest working. Parenteral route is faster than oral. Sublingual, inhalation and intravenous routes allow most rapid absorption of poisons.
2. **Age** - Children and older people have more effect as compared to young one.
3. **Idiosyncrasy** (Undesirable and uncontrolled effect)- Sometimes a small or otherwise innocuous dose of a substance may result in severe toxicity. Example. hypersensitivity, allergy.
4. **Dose** - It is directly proportional i.e., larger dose will produce more rapid and intense poisoning.
5. **Concentration of poison** - It is directly proportional i.e., higher the concentration more the fatality.
6. **Chemical state of poison** - Pure metallic arsenic and mercury are not poisonous but white arsenic is poisonous.
7. **Physical state of poison** - Gaseous or volatile poisons are very quickly absorbed and do fast action.
8. **Area of application** - It is directly proportional i.e., more the dose, more the effect.
9. **Tolerance** - Females are more affected than male, healthy person tolerates better than sick person and a disease-free person is less affected than diseased one.

8. Visha Vardhaka bhava and Visha Sankata

Visha Vardhaka Bhava (increase of effect of poison)

क्षुत्तृष्णाघर्मदौर्बल्यक्रोधशोकभयश्रमैः	I
अजीर्णवर्चोद्विगतापित्तमारुतवृद्धिभिः	II
तिलपुष्पफलाघ्राणभूबाष्पघनगर्जितैः	I
हस्तिमूषिकवाद्भिन्ननिःस्वनैर्विषसङ्कटैः	II
पुरोवातोत्पलामोदमदनैर्वर्धते	विषम् ।

(अ.ह.उ. 35/61-63)

The effect of poison increases from Kshudha (hunger), Trishna (thirst), Gharma (heat), Daurbalya (weakness), Krodha (anger), Shoka (grief), Bhaya (fear), Shrama (exertion), Ajirna (ingestion) and Varcha (Atisara-diarrhoea), Pitta Vata Prakopa, Tila Pushpa Madana Phala Ghrana (smelling the flower and fruits of Tila), Bhubashpa (fumes of the earth), Ghanagarjita (thunder), Sound of roaring of the elephant, squeaking of mice and sound of musical instruments, during Visha Sankata (fatal periods) direct breeze, fragrance of Uropa and Madana (sexual desire).

दर्वीकराणां विषमाशुघाति सर्वाणि चोष्णे द्विगुणीभवन्ति ।
अजीर्णपित्तातपपीडितेषु बालप्रमेहिष्वथ गर्भिणीषु ॥
वृद्धातुरक्षीणबुभुक्षितेषु रूक्षेषु भीरुष्वथ दुर्दिनेषु ।
(सु.क. 3/39-40)

- दर्वीकराणां विषमाशुघाति - Poison of hooded snake causes death quickly.
- सर्वाणि चोष्णे द्विगुणीभवन्ति - All poisons become doubly powerful during hot conditions;
- अजीर्णपित्तातपपीडितेषु बालप्रमेहिष्वथ गर्भिणीषु, वृद्धातुर-क्षीणबुभुक्षितेषु हृक्षेषु भीरुष्वथ दुर्दिनेषु - Those having indigestion, suffering from increases of pitta and sunlight; children, diabetics, pregnant women, old persons, persons who are sick and emaciated, who are hungry, dry and fearful and when bitten on sunless days.

Visha Sankata (विष संकट)

विषप्रकृतिकालान्नदोषदूष्यादिसङ्गमे
विषसङ्कटमुद्दिष्टं शतस्यैकोत्र जीवति ॥
(अ.स.उ. 40/84)

- विषप्रकृति : पित्तप्रकृति

- विषकाल : वर्षा and ग्रीष्मऋतु
- अन्न : कटु-तिक्त रस
- दोष : पित्त दोष
- दूष्य : रक्त

The combination time of natural qualities of the poison and constitution of the person, the time (season, period of day and night) food (type of food, relation to digestion) Doshas and Dushya is known as Visha Sankata, one out of hundred who have reached this stages survives.

9. Vishavega, Vegantara and Sthavara Visha Veganusara Lakshana and Chikitsa

Vishavega (विष वेग)

धात्वन्तरेषु याः सप्त कलाः संपरिकीर्तिताः ।
तास्वेकैकामतिक्रम्य वेगं प्रकुरुते विषम् ॥
(सु.क. 4/40)

The interval which appears while poison is driven by Vayu from one Kala to another is known as Vega-Antara (interval between phases). Visha crossing over each of the seven Kalas (membranes) successively, situated in the midway region between two Dhatus, produces different phases of effect. This is termed as Visha Vega (velocity of poison). Visha Vega rise respectively to the seven stages and finally it invades the Ojas. Because of this Sushruta and Vagbhata Acharya described seven Vega of the poison, but Charaka Acharya considered the death as the eight Vega of the poison and described eight Vega of the poison. In animals the Vega of the poison are four and in birds the Vega of poison are three in number.

Sign and symptoms

Vega	Involved Dosha and Dushya	Acc. to Charaka Acharya	Acc. to Sushruta Acharya
Prathamam Vega	Rasa	Trishna (thirst), Moha (unconsciousness), Danta Harsha (tingling sensation in teeth), Praseka (salivation), Vamathu (vomiting) and Klama (mental fatigue)	Shyava Jihva Stabdha (Bluish discoloration of the tongue with loss of movement), Murccha (Fainting), Swasha (Dyspnoea).

Dvitiya Vega	Rakta	Vaivarnya (discoloration of the skin), Bhrama (giddiness), Vepathu (tumbling), Bhrama (fainting), Jrumbha (yawning), Anga Chimichima (tingling sensation in the limbs) and Shwasa (dyspnea).	Vepathu (shivering), Sada (Debility), Daha (Burning sensation), Kantharuja (pain in the throat) Hrudaya Vedana (pain in heart)
Tritiya Vega	Mamsa	Mandala (skin rash), Kandu (itching), Shvayathu (edema) and Kotha (urticarial).	Tatushosha (Dryness of palate), Amashaya Tivrashula (Severe pain in the stomach), Netra Vivarna, Harita, Shothayukta (Eyes will have altered colour or green colour associated with swelling)
Chaturtha Vega	Vayu	Daha (burning sensation), Chardi (vomiting), Anga Shula (pain in the limbs), Murccha (fainting)	Pakvashaya Amashaya Toda (pain in the stomach and intestine), Hikka (hiccup), Kasa(cough), Antrakunjana (Intestinal gurgling), Shiroroga (Feeling of severe heaviness of head)
Panchama Vega	Sarva Srotas	Rom Nila Darshana (blue vision) or Tama Darshana (dark vision)	Kapha Praseka (more elimination of Kapha), Vaivarnya (discolouration), Parvabheda (pain in the joints), Sarvadosha Prakopa (Aggravation of all doshas), Pakvadhana Vedana (Pain in the large intestine)
Shashta Vega	Sarva Srotas	Manifestation of Hikka (hiccup)	Prajna Pranashya (There will be loss of consciousness), Ativa Atisara (Severe Diarrhea)
Saptama Vega	Sarva Srotas	Skandha Bhanga (paralysis of the muscles in the shoulder girdle)	Skandha Prushta Katibhanga (Cutting pain in the shoulders, back and waist), Shwasarodha Mrutyu (Cessation of breathing).
Ashta Vega	Sarva Srotas	Affected moves toward Mrutyu (death).	-

Acharya Sushruta has mentioned only seven Vegas for Humans. There are seven Kalas in the body, and these Vegas (stages) appear when the Visha crosses the Kalas successively. After Saptama Vega, the Visha which spread by bite, returns back to Damshadesha (site of bite), and the Visha consumed orally returns to the Hridaya (heart) to cause death of the patient as the final stage.

Visha Vega in Pashu (animal) and Pakshi (birds)

चतुष्पदां स्याच्चतुर्विधः, पक्षिणां त्रिविधः ॥
सीदत्याद्ये भ्रमति च, चतुष्पदो वेपते, ततः शून्यः ।

मन्दाहारो म्रियते श्वासेन हि चतुर्थवेगे तु ॥
ध्यायति विहगः प्रथमे वेगे, प्रभ्राम्यति द्वितीये तु ।
स्वस्ताङ्गश्च तृतीये विषवेगे याति पञ्चत्वम् ॥

(च.चि. 23/21-23)

In Chatushpada (quadruped) animals, the effects of poisoning are manifested in four different stages, the clinical feature of four stages of poisoning in Pashu (animals) are as follow.

- In the first stage, the animal gets Angasada (depression) and Bhrama (giddiness)
- In the second stage, the animal Vepate (trembles).

- In the third stage, the animal feels Shunya (emptiness) and Manda Ahara (it stops eating) and
- In the fourth stage, the animal dies because of the Shwasa Avarodha (obstruction to respiration).

There effect of poison is manifestation in third stages in Pakshi (birds)-

- In the first stage, the bird gets Dhyayati Vihga (depressed)
- In the second stage, the bird gets Bhrama (giddiness) and

In the third stage, the bird Srastanga (develops looseness of the limbs) resulting in death.

Visha Vegantara (विष वेगान्तर)

येनान्तरेण तु कलां कालकल्पं भिनत्ति हि ।
समीरणेनोह्यमानं तत्तु वेगान्तरं स्मृतम् ॥

(सु.क. 4/41)

The time in which the Visha travels from one kala to another kala breaking the barriers stimulated by Vata, is known as Visha Vegantara.

Acharya Charaka has described eight Visha Vegas which are common to both Sthavara Visha and Jangama Visha, while Acharya Sushruta have described seven Visha Vegas. Acharya Charaka has also mentioned four Visha Vegas for animals and three Visha Vegas for birds.

स्थायर विष सामान्य लक्षण

स्थायरं तु ज्वरं हिक्कां दन्तहर्षं गलग्रहम् ।
फेनवम्यरुचिश्चासमूर्च्छाश्च जनयेद्विषम् ॥

(च.चि. 23/16)

Sthavara Visha (poison of immobile origin or plant/earthen poison) produces the following clinical symptoms :

- Jwara- Fever
- Hikka -Hiccup
- Danta Harsha -Tingling sensation in the teeth
- Galagraha -Obstruction in the throat
- Phena Vamana -Vomiting of frothy material,
- Aruchi -Anorexia,
- Shwasa -Dyspnoea,

- Murccha -Fainting like signs and symptoms.

स्थायर विष विशिष्ट लक्षण

उद्वेष्टनं मूलविषैः प्रलापो मोह एव च ।
जृम्भाङ्गोद्वेष्टनश्चासा ज्ञेयाः पत्रविषेण तु ॥
मुष्कशोफः फलविषैर्दाहोऽन्नद्वेष एव च ।
भवेत् पुष्पविषैश्छर्दिराध्मानं मोह एव च ॥
त्वक्सारनिर्यासविषैरुपयुक्तैर्भवन्ति हि ।
आस्यदौर्गन्ध्यपारुष्यशिरोरुक्कफसंस्त्रवाः ॥
फेनागमः क्षीरविषैर्विड्भेदो गुरुजिह्वता ।
हृत्पीडनं धातुविषैर्मूर्च्छा दाहश्च तालुनि ॥
प्रायेण कालघातीनि विषाण्येतानि निर्दिशेत् ।

(सु.क. 2/7-10)

Sthavara Visha	Lakshana
Mula Visha	Pralapa, Moha
Patra Visha	Jrimbha, Angodveshtana
Phala Visha	Mushka Shosha, Daha, Annadvesha
Pushpa Visha	Chardi, Adhmana, Moha
Twak, Sara and Niryasa Visha	Asya Daurgandha, Parushata, Shiroruka, Kaphastrava
Ksira Visha	Phenagama, Atisara, Guru Jihva
Dhatu Visha	Hrutpidana, Murccha, Talu Daha

कन्द विष भेद-	मुस्तक	=	2
	वत्सनाभ	=	4
	सर्षप	=	6
	Other	=	each one.

कन्दविष लक्षण

कन्दजानि तु तीक्ष्णानि तेषां वक्ष्यामि विस्तरम् ॥
स्पर्शाज्ञानं कालकूटे वेपथुः स्तम्भ एव च ।
ग्रीवास्तम्भो, वत्सनाभे पीतविण्मूत्रनेत्रता ॥
सर्षपे वातवैगुण्यमानाहो ग्रन्थिजन्म च ।
ग्रीवादौर्बल्यवाक्सङ्गौ पालकेऽनुमताविह ॥
प्रसेकः कर्दमाख्येन विड्भेदो नेत्रपीतता ।
वैराटकेनाङ्गदुःखं शिरोरोगश्च जायते ॥
गात्रस्तम्भो वेपथुश्च जायते मुस्तकेन तु ।
शृङ्गीविषेणाङ्गसाददाहोदरविवृद्धयः ॥
पुण्डरीकेण रक्तत्वमक्ष्णोर्वृद्धिस्तथोदरे ।
वैवर्ण्यं मूलकैश्छर्दिहिककाशोफप्रमूढताः ॥
चिरेणोच्छ्वसिति श्यावो नरो हालाहलेन वै ।

महाविषेण हृदये ग्रन्थिशूलोद्गमौ भृशम् ॥
कर्कटेनोत्पत्यूर्ध्वं हसन् दन्तान् दशत्यपि ।
(सु.क. 2/11-17)

Kanda Visha	Lakshana
Kalakuta	Asparshajana, Vepathu, Stambha
Vatsanabha	Grivastambha, Pitavinmutra Netra
Sarshapa	Vata Vaigunya, Anaha, Granthi Roga
Palaka	Grivadaurbalya, Vak Sangha
Kardama	Mukha Praseka, Vidabheda, Netra Pitata
Vairataka	Netra Dukha, Shiroroga
Mustaka	Gatrastambha, Vepathu
Shruggi	Angasada, Daha, Udara Vruddhi
Pundarika	Raktva Aksho, Vruddhi Udara
Mulaka	Vaivarnya, Chardi, Hikka, Shopha and Muthata
Halahala	Shwara Avarodha, Shyava Nara
Mahavisha	Hrudaya Granthi, Hrudaya Shula
Karkataka	Utpata Urdhwa Hasana, Dantana Dashatya

स्थायर विष वेग लक्षण

स्थायरस्योपयुक्तस्य वेगे तु प्रथमे नृणाम् ।
श्यावा जिह्वा भवेत्स्तब्धा मूर्च्छा श्वासश्च जायते ॥
द्वितीये वेपथुः सादो दाहः कण्ठरुजस्तथा ।
विषमामाशयप्राप्तं कुरुते हृदि वेदनाम् ॥
तालुशोषं तृतीये तु शूलं चामाशये भृशम् ।
दुर्वर्णं हरिते शूने जायेते चास्य लोचने ॥
पक्वामाशययोस्तोदो हिक्का कासोऽन्त्रकूजनम् ।
चतुर्थे जायते वेगे शिरसश्चातिगौरवम् ॥
कफप्रसेको वैवर्ण्यं पर्वभेदश्च पञ्चमे ।
सर्वदोषप्रकोपश्च पक्वाधाने च वेदना ॥
षष्ठे प्रज्ञाप्रणाशश्च भृशं चाप्यतिसार्यते ।
स्कन्धपृष्ठकटीभङ्गः सन्निरोधश्च सप्तमे ॥

(सु.क. 2/34-39)

Vega	Sign and Symptoms
Prathama Vega	Shyava Jihva Stabdha (Bluish discolouration of the tongue with loss of movement), Murccha (Fainting), Swasha (Dyspnoea).
Dvitiya Vega	Vepathu (shivering), Sada

	(Debility), Daha (Burning sensation), Kantharuja (pain in the throat) Hrudaya Vedana (pain in heart)
Tritiya Vega	Tatushosha (Dryness of palate), Amashaya Tivrashula (Severe pain in the stomach), Netra Vivarna, Harita, Shothayukta (Eyes will have altered colour or green colour associated with swelling)
Chaturtha Vega	Pakvashaya Amashaya Toda (pain in the stomach and intestine), Hikka (hiccup), Kasa (cough), Antrakunjana (Intestinal gurgling), Shiroroga (Feeling of severe heaviness of head)
Panchama Vega	Kapha Praseka (more elimination of Kapha), Vaivarnya (discolouration), Parvabheda (pain in the joints), Sarvadosha Prakopa (Aggravation of all doshas), Pakvadhana Vedana (Pain in the large intestine)
Shashta Vega	Prajna Pranashya (There will be loss of consciousness), Ativa Atisara (Severe Diarrhea)
Saptama Vega	Skandha Prushta Katibhanga (Cutting pain in the shoulders, back and waist), Shwasarodha Mrutyu (Cessation of breathing).

According to Vagbhata Acharya

Vega	Lakshana
Prathama Vega	Rakta Dushti
Dvitiya Vega	Shvayathu
Tritiya Vega	Anga Chimachim
Chaturtha Vega	Jwara, Murccha
Panchama Vega	Pandu, Jihva Shosha
Shashta Vega	Hrudya Vyatha
Saptama Vega	Mrutyu

स्थायर विष सामान्य चिकित्सा

आदावामाशयगे वमनं त्वक्स्थे प्रदेहसेकादि ।
कुर्याद्विषक् चिकित्सां दोषबलं चैव हि समीक्ष्य ॥

(च.चि. 23/122)

If the poison has reached the Amashaya (stomach), then at the beginning should administer Vamana (emetic therapy). If the poisonous material is located in the Twaka (skin), then Pradeha (ointments) and Seka (fomentation therapy) should be administered.

पिप्पलीमधुकक्षौद्रशर्करेश्वरसाम्बुभिः ।
छर्दयेद् गुप्तहृदयो भक्षितं यदि वै विषम् ॥
(सु.क. 1/85)

If the poison is concealed secretly in the body, then the person should be made to drink the mixture of Pippali, Madhuka, Madhu (honey), Sharkara (sugar), Ikshu Rasa (juice of sugarcane) and Ambu (water) which produces Chardi (vomiting).

स्थावर विष यथाक्रम चिकित्सा

1. प्रथम वेग चिकित्सा-

चरकानुसार-

त्वङ्मांसगतं दाहो दहति विषं स्त्रावणं हरति रक्तात् ।
पीतं वमनैः सद्यो हरेद्विरेकैर्द्वितीये तु ॥
(च.चि. 23/44)

- Twak and Mamsagata Visha - Agni Karma (cauterization) causes burning of poison located in Twaka (skin) and Mamsa (flesh).
- Raktagata Visha- Sravana (drugs used to cause exudation of liquid) helps in flowing out of poison from the Rakta (blood).
- Sthavara Vishapana- Vamana (emesis) helps in eliminating poison consumed orally.
- Visha in Amashaya Pakwashayagata- The second stage of poisoning Virechana (purgation) places a definite role in eliminating the Visha from the body.

सुश्रुतानुसार-

प्रथमे विषवेगे तु वान्तं शीताम्बुसेचितम् ।
अगदं मधुसर्पिभ्यां पाययेत् समायुतम् ॥
(सु.क. 2/40)

- Vamana followed by Shitambu Parisheka.
- Madhu Sarpi mixed with Agadapana.

2. द्वितीय वेग चिकित्सा

चरकानुसार

आदौ हृदयं रक्ष्यं तस्यावरणं पिबेद्यथालाभम् ।

मधुसर्पिर्मज्जपयोगैरिकमथ गोमयरसं वा ॥
इक्षुं सुपक्वमथवा काकं निष्पीड्य तद्रसं वरणम् ।
छागादीनां वाऽसृग्भस्म मृदं वा पिबेदाशु ॥
(च.चि. 23/46-47)

In the second stage, Hrudaya (heart) should be protected and an Avarana (covering) should be made according to the availability of drugs. Madhu (honey), Ghrita (ghee), Majja (bone marrow), Paya (milk), Gairika (red ochre), Gomaya Rasa (juice of cow dung), Ikshu Supakva (well boiled sugar cane juice) or the juice squeezed out of meat of Kaka (crow) should be given to the patient for protecting the heart. Patient can be treated immediately with blood of Chaga (goat), Bhasma (ashes) or Mruda (mud) diluted with water to drink.

सुश्रुतानुसार-

द्वितीये पूर्ववद्दान्तं पाययेन्तु विरेचनम् । (सु. क. 2/41)

Vamana followed by Virechana (purgation).

3. तृतीय वेग चिकित्सा

चरकानुसार-

क्षारागदस्तृतीये शोफहरैर्लेखनं समध्वम्बु ।
(च.चि. 23/48)

In the third stage, patient can be treated with Ksharagada along with Madhu (honey) and Ambu (water) which can reduce Shopha (oedema) and is having the property of Lekhana (which scrapes out unwanted waste products from the body).

सुश्रुतानुसार-

तृतीयेऽगदपानं तु हितं नस्यं तथाऽञ्जनम् ॥
(सु.क. 2/41)

In the third stage, Agadapana, Nasya and Anjana Karma.

4. चतुर्थवेग चिकित्सा

चरकानुसार-

गोमयरसश्चतुर्थे वेगे सकपित्थमधुसर्पिः ॥ (च.चि. 23/48)

During the fourth stage, patient should be administered with Gomaya Rasa (juice of cow dung) along with Kapittha Rasa, Madhu (honey) and Sarpi (ghee).

सुश्रुतानुसार-

चतुर्थे स्नेहसंमिश्रं पाययेतागदं भिषक् ॥ (सु.क. 2/42)
Snehamishrita Agadapana.

5. पंचम् वेग चिकित्सा

चरकानुसार-

काकाण्डशिरीषाभ्यां स्वरसेनाश्च्योतनाञ्जने नस्यम् ।
स्यात्पञ्चमेऽथ..... ॥

During the fifth stage, administered with Aschyotana, Anjana and Nasya with the juice of Kakanda and Shirisha.

सुश्रुतानुसार-

क्षौद्रमधुकक्वाथयुक्तं प्रदापयेत् । (सु.क. 2/42)

Madhu and Madhuka Kwatha with Agadapana.

6. षष्ठम् वेग चिकित्सा

चरकानुसार-

षष्ठे संज्ञायाः स्थापनं कार्यम् ॥
गोपित्तयुता रजनी मञ्जिष्ठामरिचपिप्पलीपानम् ।

(च.चि. 23/49-50)

संज्ञास्थापन कर्म- During the sixth stage, should be administered with Samjna Sthapana drugs (drugs for regaining the consciousness). For that patient should be given to drink Go Pitta (cows bile) mixed with Rajani, Manjistha, Maricha and Pippali.

सुश्रुतानुसार-

षष्ठेऽतीसारवत् सिद्धिरवपीडश्च सप्तमे । (सु.कु. 2/43)

Atisaravata Chikitsa and Avapidana Nasya Prayoga

7. सप्तम्वेग चिकित्सा

चरकानुसार-

विषपानं दष्टानां विषपीते दंशनं चान्ते ॥ (च.चि. 23/50)

At the seventh stage, give poison to drink, if afflicted with the poison caused by bite, or by oral poison then should be made to be bitten by a poisonous animal- विष-प्रतिकार चिकित्सा (Antidote).

- Administration of Jangama Visha treats poisoning due to Sthavara Visha.
- Administration of Sthavara Visha treats poisoning due to Jangama Visha.

सुश्रुतानुसार-

मूर्ध्नि काकपदं कृत्वा सासृग्वा पिशितं क्षिपेत् ॥
(सु.क. 2/43)

• Avapidana Nasya

• Kakapada Prayoga

8. अष्टम् वेग चिकित्सा

शिखिपित्तार्धयुतं स्यात् पलाशबीजमगदोमृतेषु वरः ।
वार्ताकुफाणितागारधूमगोपित्तनिम्बं वा ॥
गोपित्तयुतैर्गुटिकाः सुरसाग्रन्थिद्विरजनीमधुककुष्ठैः ।
शस्ताऽमृतेन तुल्या शिरीषपुष्पकाकाण्डकरसैर्वा ॥
काकाण्डसुरसगवाक्षीपुनर्नवावायसीशिरीषफलैः ।
उद्बन्धविषजलमृते लेपौषधिनस्यपानानि ॥

(च.चि. 23/51-53)

- If the patient appears to be dead due to poisoning, then he should be given the powder of the seed of Palasha mixed with half the quantity of the Shikhi Pitta (bile of peacock).
- Alternatively, give Vartaku seeds, Phanita (a preparation of jaggery), Agara Dhuma (kitchen-shoot), Go Pitta (cow bile) and powder of Nimba.
- The pill made of Surasa, Granthi (Pippali Mula), Haridra, Daruharidra, Madhuka and Kustha mixed with cow bile is useful like Amrita and it should be given to the patient for betterment.
- Alternatively, this pill should be prepared of Surasa, Granthi (Pippali Mula), Haridra, Daruharidra, Madhuka and Kushta by triturating with the juice of the flower of Shirisha and the juice of Kakandaka.
- If the person appears to be dead because of Udbandhana (hanging), Jalamrita (poisoning or drowning in water), then the portion comprising Kakanda or Shimbi Bheda, Surasa, Gavakshi, Punarnava, Vayasi and fruits of Shirisha should be administered in the form of Lepa (ointment) along with Aupadhi (application of the paste over the head after making incisions in the form of

Kakapada or the paw of a crow, Nasya and Pana for his revival.

दोषस्थानानुसार विष चिकित्सा

Vata Sthanagata Visha Chikitsa (treatment for poison at the site of Vata)

वातस्थाने स्वेदो दध्ना नतकुष्ठकल्कपानं च ।
(च.चि. 23/62)

If the Visha is located in Vata Sthana (site of Vata), administer Swedana (fomentation therapy) and should be given to drink the paste of Nata and Kushta mixed with Dadhi (curd).

Pitta Sthanagata Visha Chikitsa (treatment for poison at the site of Pitta)

घृतमधुपयोऽम्बुपानावगाहसेकाश्च पित्तस्थे ॥
(च.चि. 23/62)

If the Visha is located in Pitta Sthana (site of pitta), then administer with Ghrita (ghee), Madhu (honey), Paya (milk), Ambupana (water to drink)

and also given Avagaha and Parisheka

Kapha Sthanagata Visha Chikitsa (treatment for poison at the site of Kapha)

क्षारागदः कफस्थानगते स्वेदस्तथा सिराव्यधनम् ।
(च.चि. 23/63)

If the Visha is located in Kapha Sthana (site of Kapha), then administer with Ksharagada, Swedana (fomentation) and Sira Vyadhana (bloodletting).

Rakta Sthanagata Visha Chikitsa (treatment for poison at the site of Rakta)

दूषीविषेऽथ रक्तस्थिते सिराकर्म पञ्चविधम् ॥
भेषजमेवं कल्प्यं भिषग्विदाऽऽलक्ष्य सर्वदा सर्वम् ।
स्थानं जयेद्धि पूर्वं स्थानस्थस्याविरुद्धं च ॥
(च.चि. 23/63-64)

If the Visha is located in Rakta Sthana or if afflicted with Dushi Visha then administer with Sira Vyadhana (bloodletting) and Panchakarma.

Sr. No	Sthanagata Visha	Chikitsa
1.	Vata Sthanagata Visha	Swedana, Nata Kushta Kalka Pana
2.	Pitta Sthanagata Visha	Ghrita, Madhu, Paya Ambupana, Avagaha Pariseka
3.	Kapha Sthanagata Visha	Ksharagada Swedana, Siravyadha
4.	Dushi Visha/ Rakta Sthana Gata	Sira Vyadha and Panchakarma

10. Visha Peeta and Vishamukta Lakshana

विषपीत लक्षण

विषं हि देहं सम्प्राप्य प्राग्दूषयति शोणितम् ।
कफपित्तानिलांश्चानु समं दोषान् सहाशयान् ॥
ततो हृदयमास्थाय देहोच्छेदाय कल्पते ।
(अ.सं.उ. 35/9-10)

Poison having entered the body vitiates the blood first next the Kapha, Pitta and Vata along with their respective seats, then it invades the heart and lead to the death of the body.

विषे यस्माद् गुणाः सर्वे तीक्ष्णः प्रत्येण सति देह ।
विषं सर्वमितो ज्ञेयं सर्वदोषप्रकोपणम् ॥
ते तु वृत्तिं प्रकुपिता जहति स्वां विषादिताः ।
नोपयाति विषं पाकमतः प्राणान् रुणद्धि च ॥
श्लेष्मणाऽऽवृतमार्गत्वादुच्छ्वासोऽस्य निरुध्यते ॥

विसंज्ञः सति जीवेऽपि तस्मात्तिष्ठति मानवः ॥

(सु.क. 3/25-27)

Since the qualities/ properties present in the poison are very strong/ powerful, poison is spoken of as causing aggravation of all the Doshas, they (Dosha) undergoing aggravation abandon their normal functions; poison not getting digested takes away life; Kapha obstructs the channels of breathing and makes the person unconscious though living.

सवातं गृहधूमाभं पुरीषं योऽतिसार्यते ॥
आध्मातोऽत्यर्थमुष्णास्रो विवर्णः सादपीडितः ।
उद्धमत्यथ फेनं च विषपीतं तमादिशेत् ॥
न चास्य हृदयं वह्निर्विषजुष्टं दहत्यपि ।
तद्धि स्थानं चेतनायाः स्वभावादव्याप्य तिष्ठति ॥
(सु.क. 3/35-37)

- He who eliminates faeces accompanied with Savata (flatus), the Purisha (faeces) resembling chimney soot (black in colour- Gruhadhuma)
- Liquid and expelled many times as in Atisara (diarrhoea)
- Adhmana (distention of the abdomen)
- Ushna Ashru Trava (sheds warm tears)
- Viavarna (discolouration)
- Sada Pidita (debilitated)
- Vamatya Phena (emitting froth from his mouth) should be understood as one consumed poison; even fire will not burn the heart filled with poison, since by nature it is the seat of Chetana (soul) filled with poison now.

विषपीत व्यक्ति उत्पन्न प्रारम्भिक लक्षण

शरीरं दूषिते रक्ते सर्वं चिमचिमायते ।
कोङ्गः समण्डलः स्वेदो रोमहर्षश्च जायते ॥
क्षुद्रकीटा इवाङ्गेषु विसर्पन्तीति मन्यते ।
विनामयति गात्राणि जृम्भते शिशिरप्रियः ॥
व्यापिनस्तस्य दुष्टस्य द्रुतस्य विषतेजसा ।
वातादयो वशं यान्ति बलिनोप्यबला इव ॥
(अ.सं.उ. 40/12)

When the blood is vitiated (by poison) there is Chimachimayana (tingling sensation all over the body), Kotha (reddish eruptions) and Samandala (patches appear), Sweda (perspiration) and Romaharsha (horripilation) occur, the person feels as though minute insects are crawling on the body (skin), he bends the body, Jrumbha (yawns too much), Shishira Priya (desires cold things); spreading greatly in the blood and other (tissues) the poison by its strength overpowers Vata etc. (other Doshas) even though they are strong.

विष यद्योषभूयिष्ठं तं दोषं प्राक् प्रपद्यते ।
आशये यस्य यस्यैव ततस्तदवतिष्ठते ॥
तज्जान् विकारान् कुरुते यान् सर्वेषूपदेक्ष्यति ।
वाताशयस्थं कुरुते तथा श्लेष्मामयानपि ।
पित्तश्लेष्माशयगतं तद्वत्पित्तकफोद्धवान् ॥
(अ.सं.उ. 40/13)

The poison first gets into vitiates that specific

Dosha by which it is predominant, gets localised in those organs or seats which are specific to Dosha and produces diseases born from that Dosha.

वातशय स्थित विष- वातजन्य and कफजन्य रोग

पित्ताशय स्थित विष- पित्तजन्य and कफजन्य रोग

कफाशय स्थित विष- कफजन्य and पित्तजन्य रोग

Among these, when poison is present in the Uttamanga (head), there is swelling of the head associated with appearance of rashes, especially seen around the eye, lips, nose and mouth, tingling of the teeth, dryness of the palate, pain in the head, tingling inside the mouth; eye and other sensory organs not functioning and stiffness (and pain) of the lower jaw. presence of poison in other places should be understood by the appearances of such symptoms.

विषपीत मृत्यु लक्षण/ Marana Linga (fatal signs) of Visha

नीलौष्ठदन्तशैथिल्यकेशपतनाङ्गभङ्गविक्षेपाः ।
शिशिरैर्न लोमहर्षो नाभिहते दण्डराजी स्यात् ॥
क्षतजं क्षताच्च नायात्येतानि भवन्ति मरणलिङ्गानि ।
एभ्योऽन्यथा चिकित्स्यास्तेषां चोपक्रमाच्छृणु मे ॥
(च.चि. 23/33-34)

- Nila Oshta - Bluish lips,
- Danta Shaithilya - Loose teeth,
- Keshha Pathana - Hair fall,
- Anga Bhanga - Cutting type of pain in all over body,
- Vikshepa - Convulsions,
- Shishira Loma Harsha - Absence of horripilation even if touched by cold things,
- Na Abhi Hate - non- formation of contusion marks when hit by stick,
- Danda Raji Hate or Dandakara Rekha- Absence of bleeding from ulcers.

These are the signs of imminent death of a poisoned patient.

Mrutyu Lakshana

क्षरति विषतेजसाऽसृक् तत् खानि निरुध्य मारयति जन्तुम् ।
पीतं मृतस्य हृदि तिष्ठति दष्टविद्धयोर्दशदेशे स्यात् ॥
(च.चि. 23/32)

Due to Visha Tejus (power of poison) vitiated Rakta (blood) circulates though out to obstruct Srotas (channels) leading to death of the individual. If the poison is taken orally it stays in Hrudaya (heart) and if the poison is transmitted by Damsha (bite) or from poisoned arrow, it gets lodged in the place of bite.

शंका विष

दुर्न्धकारे विद्धस्य केनचिद्विषशङ्कया ।
विषोद्वेगाज्ज्वरश्छर्दिर्मूर्च्छा दाहोऽपि वा भवेत् ॥
ग्लानिर्मोहोऽतिसारश्चाप्येतच्छङ्काविषं मतम् ।
चिकित्सितमिदं तस्य कुर्यादाश्वासयन् बुधः ॥
(च.चि. 23/221-222)

In case if someone is pierced by something in the darkness which creates suspicion of snake bite due to poisoning like agitation Jwara (fever), Chardi (vomiting), Murccha (fainting), Daha (burning sensation). Glani (malaise), Moha (mental confusion) and Atisara (diarrhoea) may appear, this poison symptoms identified as Shanka Visha.

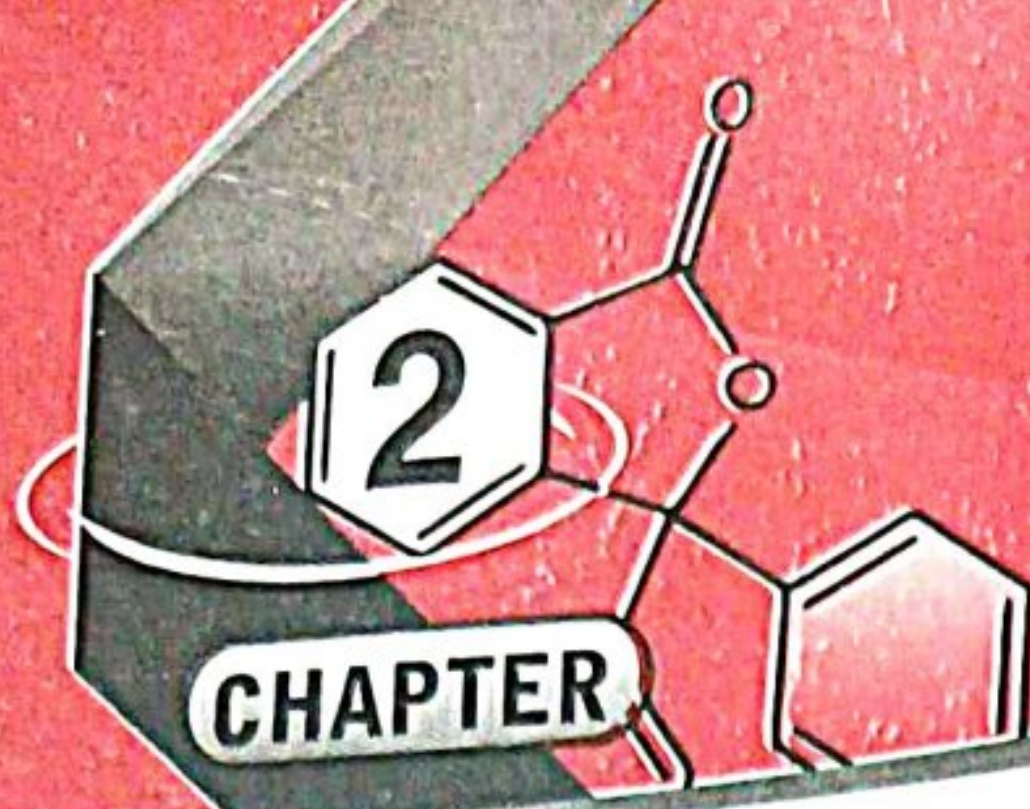
सर्पस्पृष्टस्य भीरोहि भयेन कुपितोऽनिलः ।
कस्यचित् कुरुते शोफं सर्पागभिहतन्तु तत् ॥
(अ.सं.उ. 41/36)

चिकित्सा- For the treatment of this ailment, the wise physician should console the patient. He should be given Sharkara, Shuddha Gandhaka, Draksha, Payasya, Madhuka and Madhu along with Mantraputa Ambu (incanted water). The water should also be sprinkled over the patient's body. He should be consoled and made cheerful.

विषमुक्ति लक्षण

प्रशान्तदोषं प्रकृतिस्थ धातुमाहारकामं सममूत्र विटकम् ।
प्रसन्नवर्णेन्द्रिय चित्तचेष्टं वैद्योऽवगच्छेदविषं मनुष्यम् ॥
(अ.सं.उ. 47/26)

1. प्रशान्त दोषं- दोष समान्य अवस्था (Normal Dosha Avastha)
2. प्रकृतिस्थ धातु- रसादि धातु प्राकृत अवस्था (Normalcy of Dhātu)
3. आहारकामं- भोजन ग्रहण इच्छा (Desire for food)
4. सममूत्र विटकम् - Normal urine and stool
5. प्रसन्नवर्णेन्द्रिय - Normal complexion, sense organs, state of mind
6. चेष्टं - Normal activities.



Visha Chikitsa (Management of Poisoning)

Syllabus

1. Diagnosis of poisoning in living & dead
2. ChaturvimshatiUpakrama.
3. General principles of management of poisoning.
4. Duties of medical officer in case of suspected poisoning.

Learning objective

1. Describe the diagnosis of poisoning in living and dead.
2. Enumerate and discuss ChaturvimshatiUpakrama
3. Describe the general principles of management of poisoning
4. Describe the duties of medical officer in case of suspected poisoning.

Total - 9 hours (Lecture :05 hour, Non-lecture: 04 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- Yes

1. Diagnosis of Poisoning in Living & Dead

Diagnosis of poisoning

A patient with consumption of poison may present as:

1. Fulminant poisoning
2. Acute poisoning
3. Subacute poisoning
4. Chronic poisoning

Diagnosis of poisoning in Living

1. By History taking
2. Symptoms
3. Clinical examination
4. Laboratory examination.

1. History taking

- Sudden onset of vomiting/diarrhoea/pain in abdomen
- Onset of symptoms to many persons who had taken food together
- History of consumption of poison or suspicious material

2. Symptoms

1. Persistent vomiting and/or diarrhoea with or without dehydration
2. Pain in abdomen
3. Altered sensorium/drowsiness/unconsciousness/coma
4. Breathlessness, constriction in chest, choking sensation
5. Convulsions
6. Palpitations, arrhythmias, chest pain
7. Hypothermia
8. Paralysis

3. Clinical Examination

(1) General Examination

A. Specific odour

Kerosene like	Organophosphorus
Fishy	Zinc phosphide
Rotten egg	H ₂ S

B. Taste :

Sweet	Aconite, Carbolic acid
Bitter	Datura, strychnine

Acrid	Calotropis
Sour	Oxalic acid
Metallic	Copper, Iodine
C. Temperature :	
Hypothermia	Alcohol, CO, Opiates
Hyperthermia	Cocaine, Dhatura
D. Ocular changes :	
Diplopia	Opium, Cannabis, Alcohol
Blurred vision	Alcohol, Dhatura, Aconite, Nicotine
Photophobia	Hg
Miosis	Opium, Organophosphorus, Barbiturate
Mydriasis	Alcohol, Dhatura
E. Oral manifestations	
Salivation	Organophosphates, Alcohol, Aconite, Scorpion
Dryness of mouth	Datura, Ephedrine
Gingival hyperplasia	Phenytoin, Sodium valporate
Stomatitis	Cyanide, Calotropis
Glossitis	Cyanide
Discoloration of teeth	Fluoride, Tetracycline

(2) Central Nervous System

- Grading of coma (by Glasgow coma scale)
- Patient may be drowsy, deliriant or in coma

Convulsions	Opium, Alcohol, Calotropis poisoning etc.
Tremors	Alcohol, Hg, Cocaine poisoning
Neuropathy	Lead, Organophosphorus poisoning
Movement disorder	Strychnine poisoning - Rigidity, CO poisoning - Parkinsonism
Paralysis	Arsenic, Lead, Curare poisoning)
Headache	Alcohol, Tobacco, Cyanide poisoning
Paresthesia	Ergot, Lead, Alcohol poisoning

Gait	Rolling gait - in Alcohol, Barbiturate poisoning; Stiff gait - in Reserpine
Delirium	Dhatura, Cannabis, Cocaine poisoning
Encephalopathy	Arsenic, Lead, Thallium poisoning
Tingling	Aconite, Cyanide poisoning
Ataxia	Narcotic, Lead, Alcohol poisoning
Psychosis	Cannabis, Dhatura, Alcohol poisoning

(3) Cardiovascular System

- Pulse-tachycardia/bradycardia
- Blood pressure: hypotension/hypertension
- Arrhythmias
- Circulatory collapse
- Vasoconstriction

(4) Respiratory System

- Dyspnoea
- Pulmonary edema
- Respiratory distress
- Cough
- Laryngospasm
- Bronchitis
- Emphysema

(5) Gastrointestinal System

- Vomiting
- Diarrhoea
- Constipation
- Gastroenteritis
- Melena
- Abdominal pain
- Abdominal distension
- Ileus
- Thirst
- Dysphagia
- Odynophagia

(6) Genitourinary System

- Colour of urine

- Albuminuria
- Haemoglobinuria
- Glycosuria
- Hematuria
- Porphyrinuria
- Oliguria
- Polyuria
- Dysuria.

(7) Musculoskeletal System

- Myopathy
- Myalgia
- Rhabdomyolysis
- Fasciculation
- Smooth muscle depressant/stimulant

(8) Blood manifestations

- Anemia
- Blood dyscrasia
- Thrombocytopenia
- Leukocytosis
- Leukopenia
- Pancytopenia
- Polycythemia
- Stippling
- Bone marrow depression
- Hemolysis
- Methemoglobin formation
- Sulfhemoglobinemia

(9) Ear Manifestations

- Rhinorrhea
- Deafness
- Vertigo
- Tinnitus

(10) Others

- Poisons causing fever
- Poisons acting on enzyme system
- Excretion of poison

4. Laboratory Examination

- To determine the presence of poison and other toxic agent in blood, urine and vomitus
- CBC, LFT, KFT
- Sr. electrolyte

- ABG etc.

Evidence of poisoning in dead

In fatal cases, evidence of poisoning needs to be approached on the following lines:

1. History (information from the inquest report and from the relatives of the deceased).
2. Clinical record (in case of hospitalised victims).
3. Postmortem findings.
4. Discovery of poison in the viscera and blood by chemical analysis.

Diagnosis of poisoning in dead

1. Autopsy findings
2. Laboratory examination

1. Autopsy Examination

- Evidence of soiling of clothes
- Presence of bottle/container/label in pocket
- Presence of suicide note
- Vitriol age
- Trickling of poison/stigmata of poison over skin
- Presence of injuries
- Smell from body
- Rigor mortis: in some condition rigor may appear early or in some delayed
- Postmortem lividity: poisons may impart peculiar colour
- Some poisons resist decomposition or some may hasten.

Internal Examination in autopsy examination

1. Cranial cavity: Presence of odour/cerebral edema/haemorrhages.
2. Chest cavity: Presence of pleural effusion, pericardial effusion, state of lungs and heart, haemorrhages, pulmonary edema
3. Abdominal cavity: Stomach contains gastric contents of various colours. Mucosa may show erosions, ulcers, haemorrhagic gastritis or perforation. Gastric mucosa may be stained with the colour of poison.
4. Examine the state of intestine, liver, spleen,

kidneys, pancreas, bladder, oesophagus, lip, and oral cavity.

2. Laboratory Examination

It consists of analysis of viscera, body fluids and blood for poisons.

The laboratory method consists of:

1. Qualitative assays - type of poison is known, eg. Thin layer chromatography
2. Quantitative assays - type of poison as well as quantitation can be known. eg:
 - Gas chromatography
 - High performance liquid chromatography
 - Mass spectrometry
 - Radio-immuno assay
 - Atomic absorption spectrophotometry
 - Neutron activation analysis.

विषाक्त अचिकित्स्य लक्षण

शस्त्रक्षतेयस्यनरक्तमेतिराज्योलताभिश्चनसंभवन्ति ॥
 शीताभिरद्भिश्चनरोमहर्षोविषाभिभूतंपरिवर्जयेत्तम् ।
 जिह्वासितायस्यचकेशशातोनासावभङ्गश्चसकण्ठभङ्गः ॥
 कृष्णः सरक्तः श्वयथुश्चदंशेहन्वोः स्थिरत्वंच स वर्जनीयः ।
 वर्तिर्घनायस्यनिरेतिवक्त्राद्रक्तंस्त्रवेदूर्ध्वमधश्चयस्य ॥
 दंष्ट्रानिपाताः सकलाश्चयस्यतंचापिवैद्यः परिवर्जयेत्तु ।
 उन्मत्तमत्यर्थमुपद्रुतं वा हीनस्वरंवाऽप्यथवाविवर्णम् ॥
 सारिष्टमत्यर्थमवेगिनंचजह्यान्नरंतत्रनकर्मकुर्यात् ॥
 (सु.क. 3/40-44)

When blood does not flow out when cut by a sharp instrument, if mark do not develop on the body when tied with creepers (ropes), if horripilation does not happen when cold water is sprinkled on him-such a person should be rejected; he whose tongue is white, hairs have fallen off, nose and throat have been broken (disordered), the site of the bite having swelling, is black mixed red in colour and whose lower jaw is stable (not moving) such a person should also be rejected. He, from whose mouth thick wicks (thread like structures) come out, blood flows out from upper and lower orifices and has been bitten all over the body- should also be rejected by the physician. He, who has become severely insane, has more complications, low voice, discoloured, has

developed fatal signs and who does not respond to anything (touch, sound etc) should also be rejected and no treatment needs to be done.

शवपरीक्षा

पीतमृतस्यहृदयेजग्धदिग्धाभिविद्ध्योः ।
 दंशेतिष्ठतिभूयिष्ठंसर्वतः पिण्डितंविषम् ॥

(अ.स.उ. 40/26)

In the cadaver of the animal, dead by consuming poison will be found accumulated in the heart. If dead by being bitten by poisonous insects etc, or dead by wound of weapons smeared with poison then poison will be found at the site of bite or wound.

2. Chaturvimshati Upakrama

Twenty-four Visha Upakrama (treatment modalities)

मन्त्रारिष्टोत्कर्तननिष्पीडनचूषणाग्निपरिषेकाः ।
 अवगाहरक्तमोक्षणवमनविरेकोपधानानि ॥
 हृदयावरणाञ्जननस्यधूमलेहौषधप्रशमनानि ।
 प्रतिसारणंप्रतिविषंसंज्ञासंस्थापनंलेपः ॥
 मृतसञ्जीवनमेवचविंशतिरेतेचतुर्भिरधिकाः ।
 स्युरूपक्रमायथायेयत्रयोज्याः शृणुतथातान् ॥
 (च.चि. 23/35-37)

In order to cure the patient afflicted with poison, the twenty-four therapeutic measures to be adopted are as follows:

1. Mantra - Recitation of Mantras
2. Arishta Bandhana -Tying an amulate impregnated with mantra or tying a bandage above the place of bite
3. Utkartana - Excision of the part afflicted with the poisonous bite
4. Nishpidana- Squeezing out blood from the place of the bite
5. Chushana- Sucking out the poison from the place of the bite
6. Agni - Cauterization
7. Parisheka - Effusion
8. Avagaha - Bath with medicated water
9. Rakta Mokshana - Blood-letting
10. Vamana - Therapeutic emesis

11. Virechana - Therapeutic purgation
12. Upadhana - Application of medicine after making an incision over the scalp
13. Hridayavaram - Giving medicines to protect the heart
14. Anjana - Application of collyrium
15. Nasya - Inhalation of medicated oil, etc.
16. Dhuma - Smoking therapy
17. Leha - Drugs in the form of linctus given for licking
18. Aushadha - Administration of anti-toxic drugs or wearing as an amulet
19. Prashamana - Sedatives
20. Pratisarana - Application of Kshara
21. Prativisha - Administration of poisons as medicines to counteract the original poison
22. Sanjna Samsthapana - Administration of medicines for the restoration of consciousness
23. Lepa - Application of medicines in the form of a paste or ointment and
24. Mrita Sanjivana - Measures for the revival of life of an apparently dead person.

1. मंत्र चिकित्सा-

मन्त्रस्यविषहरेषुश्रेष्ठत्वादग्रेऽभिधानं - Among all Chikitsa (treatment) chanting hyme is considered as supreme, so mentioned at the beginning itself.

यदुक्तं 'विषंतेजोमयैर्मन्त्रैः सत्यब्रह्मतपोमयैः यथानिवार्यतेक्षि-
प्रप्रयुक्तैर्नतथौषधैः'- The Mantra is considered as acquired with the power of Agni, Satya, Bahya and the strength of Tapa (Tejomaya, Satyamaya, Brahmamaya, Tapomaya) reduce the poison effect in body.

आरिष्टाद्विधा- मन्त्रेणरज्ज्वादिभिर्वाविषोपारिबन्धः- Timing by using tourniquets and creating obstruction by chanting hyme.

2. अरिष्टाबंधन चिकित्सा

सर्वैरेवादितः सर्पैः शाखादष्टस्यदेहिनः ।

दंशस्योपरिबंधनीयादरिष्टाश्चतुरङ्गुले ॥

प्लोतचर्मन्तवल्कानांमृदुनाऽन्यतमेन वै ।

नगच्छतिविषंदेहमरिष्टाभिर्निवारितम् ॥

(सु.क. 5/3-4)

In all persons bitten by the snake in the

extremities, first of all an Arista (ligature) made from soft cotton thread, leather band or inner bark of trees should be tied tight, four Angula (8 cm) above the bite; by tying the ligature / tourniquet, poison does not spread to other parts of the body.

दंशान्तुविषंदष्टस्याविसृतंवेणिकांभिषग्वद्ध्वा ।

निष्पीडयेद्भृशं दंशमुद्धरेन्मर्मवर्जं वा ॥

तंदंशं वा चूषेन्मुखेनयवचूर्णपांशुपूर्णेन ।

(च.चि. 23/38)

Immediately after bite, before the spreading of the poison from the place of the bite, the Venika (string or rope or tourniquet) should be tied at the proximal part of the bite, the site of the bite should be squeezed frequently and forcefully; the place of bite should be excised unless it is a vital part and the poison should be sucked out with the help of mouth filled with the Yava Churna (flour of barley) or Pamshu (dust).

3. उत्कर्तन (Incision) चिकित्सा

This is the procedure for making an incision at the bitesite. The eye blinking is regarded as one Matra kala, hence according to Vagbhata. Visha will remain at the bite site for 100 Matra Kala. This is the time when one should perform Utkartana karma. The Charaka Samhita employs an analogy to explain how cutting a tree at the base will result in the tree's demise.

Similarly, the transmission of poison in the body can be prevented by doing Utkartana at the location of the bite. A deep incision should be avoided as this can harm nearby nerves, tendons, and blood vessels.

4. निष्पीडन (Compression) चिकित्सा (squeezing out blood from the place of the bite)-

निष्पीडयचोद्धरेद्दंशंमर्मसन्ध्यगतं तथा ।

नजायतेविषावेगोबीजनाशादिवाङ्मूरः ॥

(अ.स.उ. 42/8)

It is the method of expelling the poison by squeezing the area of the bite. It is contraindicated in Marma (vital parts) and Sandhi (joints). If it is done in Marma Sthana, it will cause death in joints, and it will cause deformity of joints. The concept of pressure embolism is given in contemporary science for the management of poisoning.

5. चूषण (Suction) चिकित्सा

प्रतिपूर्यमुखं वस्त्रैर्हितमाचूषणं भवेत् ।
स दष्टव्योऽथ वा सर्पो लोष्टो वाऽपि हितक्ष्णम् ॥
(सु.क. 5/6)

It is a technique for removing the poison from the bite site. Before sucking, the mouth should be filled with Yava Churna (Hordeum vulgare), according to Acharya Charaka. It cleans the bite site of blood and Visha. Acharya Sushruta provided instructions on how to suck the Visha by putting cloth in the mouth. The Chushana karma for the Visha is performed by putting ash, or cow dung in one's mouth. Primarily on the meaty portion (mamsal region).

It is not advised if the doctor has Mukha Vrana (a mouth ulcer), as the poison will enter the blood and have the same effects as a snake bite.

6. अग्निकर्म (Cauterization) चिकित्सा

It is indicated in Twak Mamsagata Visha (Poison in skin & muscles). Dalhana opines that in viper bites Agnikarma is contraindicated; it causes pitta aggravation and leads to quick spread of poison. The material used for Agnikarma is metals and cloth. In modern it is known as Cauterization. It destroys affected tissues and minimizes infection.

7. परिषेचन चिकित्सा

It involves dusting a medicinal decoction on the bite site. A decoction created by Chandana (Santalum album) and Usheera (Vetiveria zizanioides) is used for Parisheka. Visha Vagais prevented by using cold decoction. After Rakta Mokshana (bloodletting) the remaining Rakta will attain Leenata because of the Ushna Guna of Visha. For this cold Lepa (cold pack) and Parisheka (sprinkling) should be done.

Panchavalka Kwatha Dhara is the most widely used Dhara in the viper bite. Ghrita Saindhava is used in cobra bites. Blood condensation lessens the potency stage of poison. The pace at which poison is absorbed will be reduced by appropriate irrigation of the bite. Drug Shita Guna aids in reducing additional infection in the wound; blood vessels constrict, halting further spread.

8. अवगाहन चिकित्सा (Immersion bath)

Avagaha means immersion or dipping the affected part in the medicated decoction or oils. As per modern terminology, it is known as an immersion bath. They help in proper circulation and eliminate toxic matter from the body.

9. रक्तमोक्षणचिकित्सा (Blood-letting)

प्रच्छनशृङ्गजलौकाव्यधनैः स्वाव्यंततोरक्तम् ॥
रक्ते विषप्रदुष्टे दुष्येत् प्रकृतिस्ततस्त्यजेत् प्राणान् ।
तस्मात्प्रघर्षणैरसृगवर्तमानं प्रवर्त्य स्यात् ॥
(च.चि. 23/39-40)

Rakta Mokshana (bloodletting) should be done with Prachhana (scratching with the help of rough instruments), Shringa (horn), Jalauka (leech), or Sira Vyadhana (venesection).

The blood vitiated by Visha can cause vitiation of other Dhatus there by resulting in death. Therefore, blood does not come out of site of bite, then Pragarshana (rubbing therapy) should be employed to cause the blood to flow out.

If blood does not come from the site of the bite-Pragarshana (rubbing) should be done with Trikatu, Grihadhuma, Rajani (Curcuma longa), Panchlavana (salt). As the poison spreads the patient will suffer from intoxication, depression, so the application of cold therapy will alleviate such complication.

विवर्णे कङ्गिने शूने सरुजेऽङ्गे विषान्विते ।
तूर्णविस्त्रवणं कार्यमुक्तेन विधिना ततः ॥
(सु.क. 5/36)

If the body afflicted with poison is found Vivarna (discoloured), Kathina (hard), Shuna (swollen) and Ruja (painful), then bloodletting should be done quickly according to procedure.

10. वमन चिकित्सा

शीतेशीतप्रसेकार्तश्लैष्मिकं कफकृद्विषम् ।
वामयेद्वमनैस्तीक्ष्णैस्तथामूर्च्छामिदं न्वितम् ॥
(सु.क. 5/39)

Person who has symptoms of aggravation of Kapha and having fainting and intoxication should be administered treatments which mitigate Kapha and made to vomit using strong emetics.

It is also done in latent poisoning (Dushi Visha) and concocted poisoning (Gara). It is done in animate and inanimate both types of poisoning.

11. विरेचन चिकित्सा

कोष्ठदाहरुजाध्मानमूत्रसङ्गरुगन्वितम् ।
विरेचयेच्छकृद्वायुसङ्गपित्तातुरं नरम् ॥
(सु.क. 5/40)

The person who has burning sensation and pain in the abdomen, flatulence pain of obstruction of urine, faeces and flatus should be made to purge. If a Pitta prakriti person is bitten by a snake with a Pitta predominance, and the bite is below the umbilical region and localized in the Pakvasaya, then Virechana is to be practiced, according to Ashtanga Sangraha.

12. उपधान चिकित्सा (putting medicine on the cut-portion of the scalp)

Upadhana is a unique method in which medicine is put into the scalp that has been cut. If the patient is not receiving Asadhya Lakshana, then this treatment must be administered. The injured region should next be covered with Bilwa Pramana of Mamsa made from Chagha (goat), Gavya (cow), Mahisha (buffalo) and Kukuta (cock) after making an incision like a cow's feet. If the snake bite is on the lower part of the body, Vagbhata advises making an incision on the scalp. In the same way, if it is in the upper body, an incision must be made in the feet.

13. हृदयावरण चिकित्सा

आदौ हृदयं रक्ष्यं तस्यावरणं पिबेद्यथा लाभम् ।
मधुसर्पिर्मज्जपयोगैरिकमथ गोमय रसं वा ॥
इक्षुं सुपक्वं मथ वा काकं निष्पीड्य तद्रसं वरणम् ।
छागादीनां वाऽसृग्भस्म मृदं वा पिबेदाशु ॥
(च.चि. 23/46-47)

In the second stage, Hrudaya (heart) should be protected and an Avarana (covering) should be made according to the availability of drugs. Madhu (honey), Ghrita (ghee), Majja (bone marrow), Paya (milk), Gairika (red ochre), Gomaya Rasa (juice of cow dung), Ikshu Supakva (well boiled sugar cane juice) or the juice squeezed out of meat of Kaka (crow) should be given to the patient for

protecting the heart. Patient can be treated immediately with blood of Chaga (goat), Bhasma (ashes) or Mruda (mud) diluted with water to drink.

14. अञ्जन चिकित्सा

शूनाक्षिकूटं निद्रार्तं विवर्णा विललोचनम् ।
विवर्णं चापि पश्यन्तमञ्जनैः समुपाचरेत् ॥
(सु.क. 5/41)

He who has swelling around the eyes, troubled by (loss of) sleep, eyes discoloured and dirty and vision also being unclear, should be treated by applying Anajan (collyriums).

15. नस्य चिकित्सा

शिरोग्रगौरवालस्य हनुस्तम्भगलग्रहे ॥
शिरोविरेचयेत्क्षिप्रं मन्यास्तम्भे च दारुणे ॥
(सु.क. 5/42)

When there is pain and feeling of heaviness of the head, lassitude, rigidity of the lower jaw, obstruction in the throat and severe catching pain in the neck, then purgation to the head should be given quickly.

16. धूम चिकित्सा (Fumigation)

It is the process in which medicinal smoke is utilized to fumigate and treat areas. It entails giving drugs nasally. According to reports, Nasya should be used as the first line of defence against head poisoning. According to Charaka, Nasya should be carried out whenever there is an obstruction in the nose, eyes, ear, tongue, or throat. For Nasya karma, a number of combinations include Bharangimula (Clerodendrum serratum), and Tulasi (Ocimum sanctum). This counteracts the poison's negative effects. Example-Nrikeshadhidhoopana for Keeta Visha (insect poisoning). The smoke's anti-toxic emissions penetrate the body, open up the blood vessels, and counteract the poison's poisonous effects.

17. लेह चिकित्सा (Linctus)

It is the process of preparing medication in linctus form. Lehas are utilized by Visha to stop the throat and palate from drying out. Sharkara (sugar) and Madhu (honey) are utilized as Sarva Visha Prashamana Leha and should be administered with Swarna Bhasma.

18. औषध चिकित्सा (Medicine)

The use of internal medications to treat Visha is described. Examples of Aushadha Yogas include Gandhahasthi Agada, Dhumagada, Kshara Agada, Pancha Sirisha Agada, and Mrithasanjivani Agada. Frequently done Aushada Yogas. You can administer 15 ml of Maha Kalyanaka Ghrita, 10 ml of Madhu (honey), and Bilwadi Gutika for cobra bite. Jeevaraksha Gutika and milk are administered 3 to 5 minutes later. The primary treatment for viper bites is a decoction of Bilwadi Gutika and Patoladhi Gana. Haematuria can be treated with Taruna Bhaskara Gutika and tender coconut. Dasanga Agada is frequently recommended for insect bites.

19. प्रशमन चिकित्सा (Pacifying measures)

Some doshas will still be present in the body after the elimination therapy. It is necessary to perform this Prashamana removal.

20. प्रतिसारण चिकित्सा (Rubbing)

It is a technique that involves applying and rubbing powders. Pratisarana means Pragharshana. Pratisarana is indicated in case blood fails to come out of the site of the bite during Raktamokshana. It is employed by rubbing with the powder of Sunthi, Pippali, Marica, Griha Dhuma, Rajani, Panchalavana, and Vrihat Kantakari. If Kapha is aggravated because of poisoning, then the paste of Pippali, Nagara, and Kshara triturated with butter should be applied over the site of the bite for Pratisarana.

21. प्रतिविष चिकित्सा

Prativishprayoga involves the use of a Visha Dravyato nullify the effect of another Visha. If the Visha Vega falls between the fifth and seventh Vegas, it is indicated in Prativish. Since Sthavara Visha resembles Kaphaja Guna, its upward direction. Since Jangama Visha resembles Pittaja Guna, its direction is downward. Sthavara Visha Guna and Jangama Visha Guna are diametrically opposed. As a result, it is Prativish to one another and negates the impact of Visha. It is administered following the administration of Ghritapana. Karma should be performed in the cold or early spring after

Vamana-Virechana. It should not be used during the rainy season, when a woman is pregnant, or when a child is present.

22. संज्ञास्थापनचिकित्सा

नष्टसंज्ञं विवृत्ताक्षं भग्नग्रीवं विरेचनैः ।
 चूर्णैः प्रथमनैस्तीक्ष्णैर्विषातसमुपाचरेत् ॥
 ताडयेच्च सिराः क्षिप्रंतस्य शाखाललाटजाः ।
 तास्वप्रसिच्यमाना सुमूर्ध्नि शस्त्रेण शस्त्रवित् ॥
 कुर्यात्काकपदाकारं व्रणमेव स्रवन्ति ताः ।
 सरक्तं चर्ममांसं वा निक्षिपेच्चास्यमूर्धनि ॥
 चर्मवृक्षकषायं वा कल्कं वा कुशलोभिषक् ।
 वादयेच्चागदैर्लिप्त्वा दुन्दुभीस्तस्य पार्श्वयोः ॥
 लब्धसंज्ञं पुनश्चैनमूर्ध्वचाधश्च शोधयेत् ।
 निःशेषं निहरेच्चैवं विषं परमदुर्जयम् ॥
 अल्पमप्यवशिष्टं हि भूयो वेगाय कल्पते ।
 कुर्याद्वासादवैवर्ण्यज्वरकासशिरोरुजः ॥

(सु.क. 5/43-48)

- Sanjnasamsthapana is a procedure which is followed to revive the conscious state of an unconscious person.
- Acharya Charaka advises Sanjnasamsthapana during the sixth stage of the spread of poison. Acharya Sushruta advises the following procedure for Sanjnasamsthapana.
- The person who is suffering from the effects of poison, when unconscious, with eyes wide open and neck bent, should be administered strong Pradhamananasya with powder of antitoxic drugs.
- Siravyadha (venesection) should be done immediately to the veins of the forehead and extremities of the patient.
- If desired bleeding does not appear, the expert surgeon must go for Kakapada Chikitsa as already explained.
- A drum /Dundubhi smeared with anti-poisonous drugs should be beaten near patient ears.

23. लेप चिकित्सा (Application of Ointments)

It is a method for treating bite wounds with medicinal paste. The practice of Sheetal Lepa should be carried out if a Pitta Prakriti individual experiences thirst or unconsciousness. To assist

remove any residual venom after RaktaMokshana, apply Lepa to the bitesite. Shigru Punarnavadi Lepa, which treats allergies brought on by viper bites, is a common form of Lepa.

To poison insects, use Bilvadi Gulika and Dashanga Lepa.

24. मृत संजीवन चिकित्सा

The usage of Mritasanjeevani is possible in all cases of Visha, just as amrita can give life to the dead. A formulation known as Mrithasanjeevani agada, which takes the shape of Gutika, is explained by Charaka. This eliminates all forms of Visha. When a patient appears to be dead but still has life force buried within the body, this agada is employed to revive them.

It is the method of regaining consciousness. In 6th Visha Vega Samjnasthapana Chikitsa is to be done. It is attained by Pana of Gopitta along with Haridra (Curcuma longa), Manjishta, (Rubia cordifolia), Maricha (Piper nigrum), Pippali Churna (Piper longum).

विषजन्य उपद्रव चिकित्सा

विषवेगान्मदमूर्च्छाविषादहृदयद्रवाः प्रवर्तन्ते ।
शीतैर्निवर्तयेत्तान् वीज्यश्चालोमहर्षात्स्यात् ॥
(च.चि. 23/43)

Due to the Vega Avastha of Visha (different stages), patient suffers from Mada (intoxication), Murccha (fainting), Vishada (depression), Hrudaya Drava (palpitation) etc. Application of Shita (cooling) therapies alleviates such complication. The patient should sufficiently ventilated till the occurrence of Loma Harsha (horripilation).

Contradictory treatment of Sthavara and Jangama Visha

गुणैरिति विपर्यस्तैर्निहतस्ते परस्परम् ।
युज्यान्मूलविषतस्माद्दृष्टानां पानलेपयोः ॥
विषपीतं च कुशलो वंशयेत्पवनाशिभिः ।
न विषप्रतिमं किञ्चिन्निर्विषीकरणं विषे ॥
(अ.सं.उ. 48/5-6)

Sthira Visha (Sthavara Visha- vegetable and mineral poisons) generally possesses properties similar to Shlema and spread upwards, whereas

Jangama Visha (animal poison) possesses properties of Pitta and spread downward, thus the two kinds of poison possessing opposite qualities when put together destroy each other. Hence, he who is bitten by snake should be administered poisonous roots or Sthavara Visha in form of internal and external application. The person who has consumed Sthavara Visha (vegetable poison) should not be bitten by snake by physician, nothing is equal to poison to neutralise the poison.

स्थायर विष मात्रा

चतुर्भिः षड्भिरष्टाभिर्हीनमध्योत्तमांयवैः ।
मात्रां विषस्य मौलस्य प्रयुञ्जीत यथायथम् ॥
दष्टस्य द्वौ यवो कोटैस्तिलमात्रं तु वृश्चिकैः ।
(De.me.G. 48/7-8)

Three Matra use in Sthavara Visha :

- हीन मात्रा • 4 यव
- मध्यम मात्रा • 6 यव
- उत्तम मात्रा • 8 यव
- Kita Visha- 2 यव
- Scorpion Visha- तिलमात्र
- Luta Visha- Sthavara Visha Pana along with Lepa.

यस्मादत्यर्थमुष्णं च तीक्ष्णं च पठितं विषम् ।
अतः सर्वविषेषूक्तः परिषेकस्तु शीतलः ॥
मन्दं कीटेषु नात्युष्णं बहुवातकफं विषम् ।
अतः कीटविषे चापि स्वेदो न प्रतिषिध्यते ॥
कीटैर्दृष्टानुग्रविषैः सर्पवत्समुपाचरेत् ।
(सु.क. 3/30-31)

Since poison is described as hot in potency and penetrating greatly, hence in all kinds of poisons, pouring cold water on the body is indicated, poison of insects will be slow in action, not very hot in potency and predominantly of Vata and Kapha, hence in poison of insects, sudation / fomentation is not forbidden; person bitten by insect having powerful poison should be treated like the person bitten by snake.

विषनाशक योग

- विषहर चूर्ण
- विषघ्न योग
- दूषीविषारि अगद
- बिल्वादि अगद

- दशांग अगद
- पंचशिरीष अगद
- एकसर गण
- संजीवन अगद
- अमृत सर्पि
- ऋषभ अगद
- मूर्वादि अगद
- विषघ्न महाकषाय
- क्षारागद
- मृत संजीवन अगद
- ताक्षर्य अगद
- विषापहर अञ्जनम्

3. General principles of management of Poisoning

Poisoning is the serious public health issue worldwide. According to WHO, currently poisoning cases are triploid from previous. In India, Northern region have more cases of poisoning. The most common mode of poisoning is suicidal followed by accidental poisoning. The highest incidence of poisoning is due to household agents followed by agricultural pesticides and industrial chemical, animal bites etc.

These patient have need of emergency management. Management of intoxicated patients should be a unique approach because of the challenge in diagnosis and treatment. The initial management have more important to save the life of poisoned person.

Principle of management of poisoning

A. Supportive Care

ABCD (Airway, Breathing, Circulation maintenance and Disability management)

1. Airway protection

The most common factor contributing to death in poisoning is airway obstruction. Poisoned patients have potentially compromised airway. Maintain airway in unconscious patents by positioning the patient and to clear the airway. Place the mouth and head in the sniffing position with neck flexed forward and the head extended. Jaw thrust manoeuvre should apply to create forward movement of tongue without flexing or extending the neck. Pull the jaw by placing the fingers of each hand on the angle of mandible just below the ears.

2. Breathing : Oxygenation

Oxygenation is necessary in effective

management of poisoning. It helps to protect organs and tissues damage. 100% O₂ by effective ventilation should be provided to the patient through mask placed over nose and mouth. It helps to organs (heart and brain) that are vulnerable to injury from poisoning.

3. Circulation : Hemodynamic support

For hemodynamic support and correction of metabolic derangements IV line is necessary. An intravenous line is a small plastic tube that deliver medications and fluid into vein. It is used to give fluid and medicine directly into circulation. In case of poisoning, hypotension occurs, So vasopressor drug should be given through IV infusion.

4. Disability Management

(i) **Treatment of seizures** : Seizures are common complication in poisoning. Benzodizepines, Barbiturate and Propofol are common drug used in treatment of seizures in poisoning.

(ii) **Prevention of secondary complications** : Secondary complications in poisoning are aspiration, pulmonary edema, renal failure, sepsis, hyoxia and shock. These complication should be managed as soon by effective treatment to save the life of patient.

(iii) **Dialysis** : Intermittent high flux haemodialysis to remove small water soluble toxin ex. salicylate, alcohol, lithium, valproate etc.

B. Removal of Unabsorbed Poison

If poisoning is :

- By inhalation of toxic gases: give fresh air and clear airway.
- By injectable: apply tourniquet, multiple incision and suction.
- By contact poison: wash with plain water.
- By ingestion: gastrointestinal decontamination.

1. Gastro-intestinal decontamination

a. **Drinking of milk and water** (milk is contraindicated in Phosphorus and strong acid poisoning)

b. Induced emesis:

- Only in conscious patient, if no burn on lips and mouth then induces vomiting by giving plenty of water or Syp. Ipecac/ apomorphine or by touching the fauces (inside the mouth).
- It is contraindicated in unconscious patient, pregnancy, corrosive or volatile poison ingestion.

c. Gastric lavage

- **Indications:** Conscious patient, Ingestion of poison within 1 to 2 hour.
- **Procedure:** In lateral position of patient, using stomach tube or Ryle's tube lubricated with lignocaine jelly insert in to mouth (with protecting airway), use mouth gag and confirm the position of tube in stomach and then lavage is carried out with saline or water.
- **Contraindication :** Unconscious patient, Impaired gag reflex, Corrosive/ volatile poison ingestion, Hypothermia, Esophageal varices, Significant electrolyte imbalance.

d. Activated charcoal:

- Activated charcoal is tasteless, black, fine powder. Because of its large surface area, it adsorbs the poisons in stomach and hence decreases the systemic absorption of poison.
- Dose is given as 1-2 gm/kg body weight mixed with water and this mixture is administered to patient.
- Disadvantage: Unpleasant taste, provokes vomiting, cause diarrhoea.
- **Contraindication:** Paralytic ileus, intestinal obstruction, perforation of stomach.

- **e. Whole bowel irrigation:** By administering a bowel cleansing solution containing electrolytes and polyethylene glycol orally or by gastric tube at a rate of up to 0.5 L/h in children and 2.0 L/h in adults until rectal effluent is clear.

2. Decontamination of other sites

- a. Skin decontamination: Affected area should be washed thoroughly with plain water. Remove the clothes and irrigate the area copiously with water.
- b. Eye decontamination: Irrigated with copious

water for 15 to 20 minutes.

- c. Respiratory decontamination: Put in fresh air.

3. Hastening Elimination of Absorbed Poison

- a. Multiple-dose activated charcoal
- b. Forced diuresis: By Ringer lactate or normal saline to maintain urine output 4-5 ml/kg body wt/hr.
- c. Alteration of urinary pH: 5% dextrose in normal saline containing 20-40 meq of bicarbonate.

4. Poison elimination: by extracorporeal removal

- Peritoneal dialysis
- Haemodialysis
- Haemoperfusion
- Plasmapheresis
- Exchange transfusion
- Hyperbaric oxygenation

C. Administration of Antidote

Definition of Antidote - Antidotes are the substances used to counteract or neutralize the effects of poison without causing appreciable harm to the body.

Classification

Antidotes are classified as:

- 1. Physical/ Mechanical/ Non-Specific Antidotes:** Eg. activated charcoal (adsorbing the poison and retaining it within its pores and also form a protective coating on the gastric mucosa and thus retard absorption), demulcents such as - milk, starch, egg-white (egg albumin), banana as bulky food etc.

2. Chemical Antidote

It Counteract the action of poison by neutralization or oxidising the poison to form non-toxic compound

Eg. citric acid, lemon juice in corrosive alkali poisons or milk of magnesia; potassiumpermanganate (oxidizing agent).

3. Physiological or Pharmacological Antidote

- Reduces the toxic conversion of poison - Eg. ethanol is used as antidote in methyl alcohol poisoning.

- Competition at receptor site - some antidotes are capable to compete with the poison and displace the poison from the specific receptor site. Eg. in opiate poisoning naloxone is used.
- Blocking the receptor site - some antidotes are capable of blocking the receptor site acted by poisonous substance. Eg. in organophosphorus poisoning atropine is used. Organophosphorus acts at muscarinic receptors producing toxic effects.

4. Universal Antidote

- It is an absolute antidote and had only historical importance.
- The composition of universal antidote :
Powdered charcoal (2 parts) + Magnesium oxide or milk or magnesia (1 part) + Tannic acid (1 part)
- Charcoal absorbs alkaloids, magnesium oxide neutralises acids and tannic acid precipitates alkaloids and many metals.

5. Chelating Agents

- Derived from Greek, chele=crab - the compound holds the metal like a crab's claw.
- These agents interact with poison to form an inert complex, which is then excreted from the body.
- These agents are primarily used in heavy metal poisoning.
- These agents with metal ions forms ring structure within their molecule. Examples - BAL, Succimer, Disodium edetate, Penicillamine, Desferrioxamine, Calcium disodium edetate.

Poisoning	Antidotes
Acetaminaphen (paracetamol)	N-Acetylcysteine
Nitrites, cyanides	Amyl nitrite + sodium nitrite + sodium thiosulphate
Organophosphates (anticholinesterase)	Atropine and oximes
Digoxin	Digibind or digoxin immune Fab

Ethylene glycol	Fomepizone
Heroin (opioids)	Naloxone or nalmefene or naltrexone
Benzodiazepine	Flumazenil
Datura/atropine/antihistamines	Physostigmine
Acute iron poisoning	Deferoxamine
Acute arsenic poisoning	Dimercaprol / BAL
Oxalic acid	Calcium gluconate
Strychnine	Short acting barbiturates
Phosphorus	Copper sulphate
Warfarin, Rodenticide	Vit. K

British Anti-Lewisite (BAL)

Synonyms: dimercaprol, dimercaptopropanol.

Features

It is an oily, pungent smelling liquid, developed during Second World War by British as an antidote to the arsenic war gas lewisite.

Mechanism of Action

BAL has two SH (thiol) groups. The two SH group binds to those metals that produce toxicity by interacting with sulfhydryl containing enzymes in the body. BAL will combine with these metals forming BAL-metal complex thus dislodge the metal from acting site.

Indications

BAL is useful against metals that interfere with sulfhydryl enzymes in the body such as arsenic, mercury, bismuth, copper, antimony and nickel.

Contraindications

BAL is contraindicated in iron and cadmium poisoning because BAL-iron and BAL-cadmium complex are toxic.

Dose

BAL is administered intramuscularly as 5 mg/kg stat followed by 2 to 3 mg/kg every 4 to 8 hours for two days and then once a day for 10 days.

Adverse Effects

- Tachycardia
- Vomiting
- Tingling and burning sensation
- Cramps
- Sweating

Algorithm of Management of Poisoning

Persistent bradycardia

Heart rate <50/min



ABCDE assessment



- Obtain IV access
- Monitor cardiac rhythm, BP, SPO₂
- Provide supplemental O₂ in hypoxemic
- Obtain 12-lead ECG if immediately available

**Signs of hemodynamic instability**

- Signs of acute heart failure
- Cardiac chest pain
- Signs of shock
- Hypotension
- Acutely altered mental status

Yes



IV atropine



Improved HR and hemodynamic status

Yes

- Monitor with continuous cardiac telemetry
- Have at bedside : atropine, transcutaneous pacer

No



IV epinephrine

or

IV dopamine

or

Start transcutaneous pacing



- Consult cardiology
- Prepare for transvenous pacemaker
- Transfer to ICU

Underlying cause

1. Atropine : 0.5 mg IV push every 3-5 minutes (maximum dose : 3mg)
2. Epinephrine : 2-20 mcg/min infusion
3. Dopamine : 2-20 mcg/kg/min infusion
4. Transcutaneous pacing : Start at 10mA and increase gradually until there is capture. Target rate : 60-80/min. Strongly consider sedation if the patient is conscious.

4. Duties of Medical Officer in case of Suspected Poisoning

1. In less facility hospital, first-aid measures should be given to poisoned patient and referred to higher medical centre.
2. The attending medical officer should collect and preserve evidences suggestive of poisoning (bottle of poison, clothes, remaining food, vomits, faces etc).
3. Every case of poisoning should be reported to the Police in government hospital. But doctors in private practice are not under legal obligation to inform Police of accidental or suicidal poisoning cases. However, if death of patient occurs, then police has to be informed.
4. All collected evidences should be handed over to Investigating police officer in properly sealed condition.
5. Record dying declaration of serious and conscious poisoned patient.
6. If Police requires information regarding poisoning cases, doctor should give all information.
7. In death of food poisoning cases, the Public Health Authorities must be notified.
8. Preservation of record should be necessary up to 3 years and provide it within 72 hours if patient relatives demand.

Syllabus

1. Sources of exposure of visha with contemporary relevance.
2. Vishakta aahara pariksha.
3. Adulteration and tests for its detection.
4. Techniques used in the detection of poisons.
5. Viruddha-ahara with contemporary relevance.
6. Food poisoning and amavisha.

Learning objective

- Explain the various sources of exposure of visha like anna, paana, vastra, abhyanga, lepa, paduka, abharana, etc.
- Describe the Ayurvedic methods of detection of food and beverages contaminated with visha
- Define adulteration, describe the methods of detection of adulterants and its relevance in Agada Tantra.
- Describe the modern analytical techniques for the detection of poison (in contaminated articles) like chromatography, spectroscopy, etc.
- Define viruddha ahara and explain its types.
- Discuss and illustrate the contemporary importance of Viruddha ahara with examples.
- Discuss the application of concepts of viruddha ahara in the prevention and management of diseases.
- Describe food poisoning, its types and management.
- Discuss the clinical application of principles of Agada Tantra in the management of food poisoning.
- Describe the concept of amavisha.

Total - 5 hours (Lecture :03 hour, Non-lecture: 02 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

Sources of Exposure of Visha with Contemporary Relevance

अन्ने पाने दन्तकाष्ठे तथाऽभ्यङ्गेऽवलेखने ।
उत्सादने कषाये च परिषेकेऽनुलेपने ॥
स्रक्षु वस्त्रेषु शय्यासु कवचाभरणेषु च ।
पादुकापादपीठेषु पृष्ठेषु गजवाजिनाम् ॥
विषजुष्टेषु चान्येषु नस्यधूमाञ्जनादिषु ।
लक्षणानि प्रवक्ष्यामि चिकित्सामप्यनन्तरम् ॥
(सु.क. 1/25-29)

Visha (poison) is administered mixed with is Anna (food) and Pana (drinks), Danta Kasta (tooth brush), Abhyanga (oil massaging), Lekhana (powder or paste massage), Utsadana (powder massage), Kashaya Parisheka (sprinkling medicated water), Anulepana (garlands), Vastra (dress), Shayya (bed), Kavacha Bharana (ornaments), Paduka (footwear), Padapindeshu (foot stool), Prushta Gaja Aja (on the back of elephants and horse), Nasya (nasal drops), Dhuma (smoking), Anjana (collyrium) etc.

Sthavara Visha (Inanimate Poison)

- Fruits and vegetables contaminated with pesticides.
- Infectious Fruits and vegetables.
- Fruits containing ripening agents such as Calcium carbide and also contains chemicals to delay ripening for local industries.
- Food adulteration like- Atta, edible oils, pulses, coffee, tea Vinegar, Besan Curry powder etc.
- Heavy metals toxicity in plants.
- Excessive consumption of Food made from Maida like Pizza, Burger, Bread, Samosas, Noodles, Momos, Pastas etc.
- Latex from plants like Aloe latex.
- Pollen grains / Dust

Jangama Visha (Animate Poison)

- Adulteration in milk and milk products.
- Sea food containing high levels of Hg and PCBs from water or food they eat.
- Meat prepared from infectious animal.
- Animal Dander

Other condition of poisoning

Chemical Exposure

Industrial Chemicals: Exposure to toxic industrial chemicals through work or environmental contamination is a significant concern. This includes exposure to heavy metals (lead, mercury, arsenic), pesticides, and industrial solvents.

Household Chemicals: Common household products like cleaning agents, pesticides, and certain cosmetics may contain harmful chemicals that can be toxic if ingested or absorbed through the skin.

Air Pollution

Environmental Toxins: Air pollution in urban areas can contain hazardous pollutants, such as particulate matter, volatile organic compounds, and heavy metals. Long-term exposure to polluted air can have detrimental health effects.

Water Contamination-

Chemical Pollutants: Water sources can be contaminated with various chemicals, including industrial runoff, pesticides, and even pharmaceuticals. These contaminants can lead to waterborne diseases and long-term health issues.

Food Toxins

Chemical Additives: Processed foods often contain additives, preservatives, and colorants, some of which may be harmful if consumed in large quantities.

Pesticide Residues: Residues of pesticides on fruits and vegetables can pose health risks if not properly washed or removed.

Medication and Drug Misuse

Overdose and Misuse: The misuse of prescription drugs or over-the-counter medications can lead to poisoning. This is especially relevant with the opioid epidemic and the misuse of opioids.

Biological Toxins

Bacterial Toxins: Foodborne illnesses and contaminated water can lead to exposure to bacterial toxins (e.g., E. coli, Salmonella) that can cause serious health issues.

Venomous Creatures: Encounters with venomous snakes, spiders, and other creatures can result in poisoning from their toxins.

Radiation Exposure

Ionizing Radiation: Exposure to ionizing radiation sources, such as X-rays, nuclear power plants, and radioactive materials, can result in radiation poisoning.

Lead Contamination

Lead Paint and Pipes: Old lead-based paint and plumbing in homes can lead to lead exposure, which is especially harmful to children.

Alcohol and Substance Abuse

Alcohol Poisoning: Excessive alcohol consumption can lead to alcohol poisoning, which is a form of acute toxicity.

Illegal Drugs: The use of illegal drugs,

especially synthetic drugs, can result in toxic effects and overdoses.

Environmental Toxins

Climate Change-Related Toxins: Climate change can lead to new and increased environmental toxins, such as algal blooms producing harmful toxins in water bodies.

Biological Toxins in Food

Foodborne Pathogens: Contaminated or undercooked food can lead to exposure to pathogens like Salmonella, E. coli, and Listeria.

Vishadata Lakshana

इङ्गितज्ञो मनुष्याणां वाक्चेष्टामुखवैकृतैः ॥
विद्याद्विषस्य दातारमेभिर्लिङ्गैश्च बुद्धिमान् ।
न ददात्युत्तरं पृष्ठो विवक्षन् मोहमेति च ॥
अपार्थं बहु सङ्कीर्णं भाषते चापि मूढवत् ।
स्फोटयत्यङ्गुलीभूमिमकस्माद्विलिखेद्धसेत् ॥
वेपथुर्जायते तस्य त्रस्तश्चान्योऽन्यमीक्षते ।
क्षमो विवर्णवक्त्रश्च नखैः किञ्चिच्छिनत्त्यपि ॥
आलभेतासकृद्दीनः करेण च शिरोरुहान् ।
निर्ययासुरपद्वारैर्वीक्षते च पुनः पुनः ॥
वर्तते विपरीतं तु विषदाता विचेतनः ।

(सु.क. 1/18-23)

The intelligent physician who can understand the intention of others by their speech, actions and facial expressions should recognise Visadata-the person who puts poison (to foods, drinks etc.) by the following features. He who does not reply when questioned, becomes disillusioned while talking, speaks irrelevantly and enigmatically or like an idiot, makes sound from his fingers, scratches the ground without any cause, falls on the ground, trembles with fear, looks at one another, becomes thin, discoloured in the face, tears something by his nails, pulls his hairs by hand often, is timid, tries to go out through wrong doors, looks around again and again, behaves in all opposite manners and becomes unconscious.

अत्यर्थशङ्कितः स्याद्बहुवागथवाऽल्पवाग्विगतलक्ष्मीः ।
प्राप्तः प्रकृतिविकारं विषप्रदाता नरो ज्ञेयः ॥
(च.चि. 23/107)

अत्यर्थशङ्कित - A person who behaves in an extremely suspicious manner

स्याद्बहुवागथवाऽल्पवाग्विगतलक्ष्मीः - Who is garrulous or who speaks more or very little

विगतलक्ष्मी- who has lost lustre of his face

प्राप्तः प्रकृति विकारं - who exhibits changes in characteristic features.

Such person when a person shows the characteristic features of a poison-giver then the food or such other substance served by him should not be taken.

विषदः श्यावशुष्कास्यो विलक्षो वीक्षते दिशः ॥
स्वेदवेपथुमांस्त्रस्तो भीतः स्खलति जृम्भते ।

(अ.ह.सू. 7/12)

The person who is about to poison someone will have Shyava Shushka Asya (dry and discoloured ace), Vilaksho Vikshate Dishaha (eccentrically looks in all directions), Sveda Vepathuman (sweating and tremors) Trasta (tired), Bheeta (frightened), Skhalati (slips while talking and walking), Jrumbhate (yawns frequently).

विष पांचभौतिकत्व

विष योनि	- जल
वीर्य	- अग्नि
भार	- पृथ्वी
प्रसार	- वायु
सूक्ष्मान्तर प्रवेश	- आकाश

विष पांचभौतिक परीक्षा

- Crackle when put in fire- Shabda Pariksha
- Burning, inflammation, senseless etc. by the touch - Sparsha Pariksha
- Blue colour like peacock neck when thrown into fire- Rupa Pariksha
- Death due to fly sitting on poisonous substance- Rasa Pariksha
- Headache, fainting etc. from the smell of poisonous substances- Gandha Pariksha

Vishakta Ahara Pariksha

विषाक्त अन्न परीक्षा/Vishanna Pariksha (test of poisoned food)

हुतभुक् तेन चान्नेन भृशं चटचटायते ।
मयूरकण्ठप्रतिमो जायते चापि दुःसहः ॥

भिन्नार्चिस्तीक्ष्णधूमश्च न चिराच्चोपशाम्यति ।
 चकोरस्याक्षिवैराग्यं जायते क्षिप्रमेव तु ॥
 दृष्ट्वाऽन्नं विषसंसृष्टं प्रियन्ते जीवजीवकाः ।
 कोकिलः स्वरवैकृत्यं क्रौञ्चस्तु मदमृच्छति ॥
 हृष्येन्मयूर उद्विग्नः क्रोशतः शुकसारिके ।
 हंसः क्ष्वेडति चात्यर्थं भृङ्गराजस्तु कूजति ॥
 पृषतो विसृजत्यश्रुं विष्ठां मुञ्चति मर्कटः ।
 सन्निकृष्टांस्ततः कुर्याद्राजस्तान् मृगपक्षिणः ॥
 वेश्मनोऽथ विभूषार्थं रक्षार्थं चात्मनः सदा ।

(सु.क. 1/28-33)

प्राप्यान्नं सविषं त्वग्निरेकावर्तः स्फुटत्यति ॥
 शिखिकण्ठाभधूमार्चिरनर्चिर्वोग्रगन्धवान् ।

(अ. ह. सू. 7/13)

- **Agni Pariksha** - Poisoned materials burn with single point flame (not with normal spreading flame), become like peacock's neck, interrupted and slow emit flames of different colours like rainbow, and gives out cracking sound. The emerged smoke has cadaveric smell.
- **Pariksha of animals and birds**- Voice of Kokila (cuckoo) changed, gait of swan gets altered, Bhringraja bird (domestic crane) becomes excited, Karkavaku (cock) hoots loudly, Suka (green parakeet) and Sarika (mynah) makes long loud sounds. Chamikara vomits. Karandava (white breasted goose) fly away. Birds either dies or faints. Nakula (moongoose) gets horripilation. Vanara (monkey) eliminates faeces. Prushta (spotted deer) weeps. Mayoora (peacock) gets elated.
- **Bhautika Pariksha (Poisoned foods)**- Food mixed with poison requires long time to cook. Cooked one becomes stale. Loses its natural odour, colour, smell, taste. It becomes hard. Also, it becomes very moist and appears to be full of glistening particles. Condiments mixed with poison dried very quickly. Poisoned materials burn with single point flame (not with normal spreading flame).
- **Visha Mishrita Padartha (Layers from liquid materials)**- Poisoned liquids show the

characteristics are Kvatha becomes dark, black or blue colored. Poisoned water gets distorted with more or less of the natural features, mirror images do not appear at all. Accumulation of foam, appearance of dividing lines and different kinds of striae confirms poisoning. Appearance of blue lines in Mamsa rasa (meat soup), coppery red lines in Dugdha (milk), black lines in Madya (alcohol), bluish lines in Takra (buttermilk), green lines in Madhu (honey), light brown lines in Ghrita (ghee), light red lines in Taila (oil) confirms the poisoning in respected materials.

• **Lakshana of Sthavara and Jangama Visha**

- Sthavara Visha: Jvara, Hikka, Dantaharsha, Galagraha, Phena, Vamana, Aruchi, Shvasa, Murccha
- Jangama Visha: Nidra, Tandra, Klama, Daha, Paka, Lomaharshana, Shopha, Atisara
- **Lakshana according Mode of administration**
- Vishadhuma (poisonous fumes): inhalation of poisonous fumes or smoke causes fainting, watering of eyes and mouth, headache, running nose and disturbances of the vision.
- Vapour of poisoned food: cardiac pain, abnormal movement of eyes and headache.
- Vishaja Dantakashta (poisoned tooth brush): causes dryness and swelling of palate, teeth, tongue and lips.
- Vishaja Anjana(poisoned collyrium): application causes accumulation of dirt in eyes, redness, pain, distortion of vision and even blindness.
- Vishaja Nasyadhuma (poisoned snuff and smoke): causes headache, discharge of Kapha (watery fluid), bleeding through the natural orifices (nose, mouth and eyes).
- Poisoned ear drops: causes swelling, pain, ulcers and defects of hearing.
- Smelling poisoned flowers: causes headache,

tears in the eyes and loss of sensation of smell.

- **Lakshana according to site of poison**

- Visha in mouth (ingestion): causes tingling sensation in lips, burning sensation inside the mouth, hardness at the root of tongue, lockjaw, more salivation, loss of sensation of taste, pricking pain.

- Visha in Amashaya (poisoned food in stomach): causes perspiration, toxicity, fainting, vomiting, discolouration, distention of abdomen, burning sensation, loss of appetite, appearance of rashes (spots) all over the body. Flatulence, trembling and abnormality of sense organs.

- Visha in Pakvashaya (poisoned food in intestine): causes thirst, burning sensation, fainting, diarrhoea, gurgling noise in the abdomen, stupor, loss of strength, emaciation, pallor and enlargement of the abdomen.

- **Lakshana according to use of poisoned material**

- Vishaja Taila (poisoned oil): used for oil bath produce burning sensation in the skin, perspiration, ulcers, bleed and lacerations.

- Poisoned oil for application on head: produce headache, appearance of nodules, and falling of hairs.

- Poisoned comb: causes falling of hair, headache, bleeding from passage and appearance of cysts on head.

- Poisoned wooden foot wear: causes inflammation, discharge, numbness, and eruption of boils in feet.

- Poisoned ornaments: causes burning sensation, suppuration and tearing of poisoned material.

- **Lakshana of Garvisha and Dushivisha**

- Garavisha (artificially mixed poison): Garavisha is prepared by mixing more than a single poisonous or non-poisonous drugs. It may produce swelling, anaemia, enlargement of abdomen, insanity, piles etc.

- Dushi Visha (weak/chronic poison): this is the weak and latent poison. One suffering from Dushi Visha passes liquid stool of abnormal colour, has foul smell, tasteless sensation in mouth, thirst, fainting, vomiting and other symptoms of toxicity.

- **Ashumruta Pariksha**

- External and internal findings (sings) confirm the diagnosis of poisoning. For the homicidal purpose, poison was ingested with mixing in food materials. Black coloured hands, legs, teeth and nails in the dead body confirms it.

- Improper posture, scattered cloths and the number of episodes of diarrhoea occurred confirms death by Dhatura poisoning.

- Discharge of blood from bite site, indicates snake bite.

- Food materials found in the dead was subjected to birds for the confirmation of the poisoning.

Adulteration and Tests for its Detection

It is the process in which the quality of food is lowered either by the addition of inferior quality material or by extraction of valuable ingredient. A food item is said to be adulterated if a substance which is added is injurious for human consumption.

Adulteration is a legal term meaning that a food product fails to meet the legal standards. One form of adulteration is an addition of another substance to a food item in order to increase the quantity of the food item in raw form or prepared form, which may result in the loss of actual quality of food item.

Keeping this in view, a legislation called Prevention of Food Adulteration Act, 1954 was enacted. The objective envisaged in this legislation was to ensure pure and wholesome food to the consumers and also to prevent fraud or deception.

Types of adulterants

Sand, marble chips, stones, mud, other filth, talc, chalk powder, water, mineral oil and harmful colour.

Food materials	Common adulterant
Cereals (Rice, wheat)	Stone, sand, grit
Dals (Bengal gram)	Kesari dal (Lathyrism)
Milk	Addition of water, removal of cream, addition of starch (water borne disease), soap powder, Hydrogen peroxide, Urea, Chalk powder
Ghee	Addition of vanaspati, Animal body fats
Butter	Starch, animal fat
Turmeric powder	Lead chromate powder (metanil yellow) (lead poisoning)
Black pepper	Dried seeds of papaya
Chilli powder	Brick powder, saw dust
Tea leaves	Husk of blackgram, reuse of tea leaves
Coffee seeds	Tamarind seeds
Baking powder	Citric acid
Honey	Sugar, jaggery
Sugar	Chalk
Mustard seeds	Seeds of prickly-poppy (Epidemic dropsy)
Edible oil	Mineral oil
Ice-cream	Starch, cellulose, washing powder
Asafoetida	Resins, gums
Jaggery solution	Honey (or vice-versa)
Coffee powder	Chicory
Non alcoholic Beverages	Nonpermitted colours, saccharin, dulcin, lead, arsenic, copper, dirt and filth.

Harmful effect of food adulteration

Food adulteration can have a range of harmful effects on health. It can not only lead to toxicity in the body but also can lead the body to paralysis or eventually death. Some of the adulterants are highly toxic for the body leading to heart failure, liver disorders, kidney disorders and many more.

Test for food adulteration

Adulterants can include harmful substances,

lower-quality ingredients, or contaminants that are added to food products to reduce production costs or increase shelf life. Here are some common tests and methods used to detect food adulteration:

- **Visual Inspection:** Visual inspection can reveal signs of adulteration, such as abnormal color, texture, or foreign particles in the food. For example, you can visually inspect spices for the presence of extraneous matter.
- **Taste and Smell:** Sometimes, adulterants can alter the taste or smell of a food product. Conducting a sensory evaluation can help detect any off-flavours or Odors.
- **Chemical Tests:** Various chemical tests are available to detect adulterants in food. Some examples include:
 - The iodine test for detecting the presence of starch in various food products.
 - The Sudan Red test to identify synthetic dyes in chili powder and other spices.
 - The Folin-Ciocalteu assay for measuring the total phenolic content in beverages like wine or fruit juices.
- **Microbiological Tests:** Microbiological tests can determine the presence of harmful bacteria, fungi, or other microorganisms that indicate food spoilage or contamination.
- **Spectroscopy:** Infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy can be used to analyze the molecular composition of food products, identifying any unusual compounds or contaminants.
- **DNA Testing:** DNA testing can be used to verify the authenticity of meat, seafood, and other products. It can help determine if the product contains the species claimed on the label.
- **Gas Chromatography-Mass Spectrometry (GC-MS):** GC-MS is a powerful analytical technique used to identify and quantify compounds in food, including pesticides, additives, and contaminants.
- **Thin-Layer Chromatography (TLC):** TLC is a chromatographic technique that can

be used to separate and identify components in complex mixtures. It is often used to detect the presence of contaminants in food products.

- **Immunoassays:** Immunoassays, such as enzyme-linked immunosorbent assays (ELISAs), can be used to detect specific proteins or antibodies in food. This method is often used to detect allergens or pathogens.
- **pH Testing:** Measuring the pH of a product can indicate whether it is within the expected range for that food item. Significant deviations could signal adulteration or spoilage.
- **Adulteration-Specific Tests:** Some tests are designed specifically to detect certain common adulterants, like the Rapid Milk Test for detecting water in milk or the butterfat test for checking the purity of ghee.

Example- Take some turmeric powder in a transparent glass and add a few drops of water and

concentrated hydrochloric acid to it. Next, shake it vigorously. A pink colour to the mixture indicates the presence of metanil yellow. If the mixture releases small bubbles, it indicates the presence of chalk powder.

Techniques used in the Detection of Poisons

It consists of analysis of viscera, body fluids and blood for poisons.

The laboratory method consists of:

1. Qualitative assays – type of poison is known, eg. Thin layer chromatography
2. Quantitative assays – type of poison as well as quantitation can be known. eg:
 - Gas chromatography
 - High performance liquid chromatography
 - Mass spectrometry
 - Radio-immuno assay
 - Atomic absorption spectrophotometry
 - Neutron activation analysis.

Test for detection of poison

Test name	Procedure	Result
Fujiwara test	Dilute 1ml of sample with 2ml of sodium hydroxide solution. Add 2ml ferrous sulfate solution. Add sufficient hydrochloric acid to dissolve the ferrous hydroxide precipitate.	A blue color indicates the presence of cyanide.
FPN test	5ml of ferric chloride solution, 45 ml of 20% solution of perchloric acid and 50 ml of 50% solution of nitric acid is added to make a final solution.	Color ranging from pink to red, orange, violet or blue color indicates presence of phenothiazines.
Reinsch test	Take a copper foil or wire, which is cleaned in nitric acid until the copper acquires a bright surface. Rinse the same with purified water and add 10 ml of conc. Hydrochloric acid and 20 ml of test solution in 100 ml conical flask. Heat on a boiling waterbath in a fume cupboard for 1 hour. Maintain the	Color staining on the copper can be interpreted as follows: • Copper black indicates antimony • Dull black indicates arsenic • Shiny black indicates bismuth • Silver color indicates mercury

	volume of solution by adding dilute hydrochloric acid as necessary.	
Duquenois levine test	Small amount of suspected residue of extract is placed in a test tube and shaken with 2ml. of a duquenois reagent for one minute and further 2ml of conc. Hydrochloric acid is added, shaken and allowed to stand for 10 minutes. If a color develops, 2ml of choroform is added.	The violet colored layer gives the positive indication of presence of cannabis.
Trinders test	Add 100 ml of trinders reagent to 2ml urine and mix for 5 seconds.	A violet color indicates the presence of salicylate.
Ferricyanide/ferrocyanide test	To 50 ml of filtered stomach contents or scene residue add 100 ml of aqueous hydrochloric acid (2 mol/L) and 50 ml of aqueous potassium ferricyanide solution (10 gm/l). To a further 50 ml of sample add 100 ml of hydrochloric acid and 50 ml potassium ferrocyanide solution (10 gm/L)	A deep blue precipitate with potassium ferricyanide or ferrocyanide indicates the presence of ferrous.
Gerrard's test	1-2 ml of 2% mercuric chloride solution in 50% of alcohol is added to a portion of residue of the extract. A red colour develops immediately.	Hyoscyamine produces a yellow colour which becomes red on burning, while hyoscine does not produce any change of color
Marquis reagent test	Place a drop of marquis reagent (prepared by adding 3ml of conc. Sulphuric acid and 3 drops of formalin) on the suspected scene residue or add few drops to stomach contents.	A purple coloration which gradually turns into violet and finally to blue color indicates the presence of opium and its derivatives.

Viruddha-Ahara with Contemporary Relevance

यत्किञ्चिद्दोषमांस्त्राव्य न निर्हरति कायतः ।
आहारजातं तत् सर्वहितायोऽपद्यते ॥
(च.सू. 26/85)

विरुद्धमपि चाहारं विद्याद्विषगरोपमम् ।
(अ.ह.सू. 7/29)

यत किञ्चित् दोषमुत्क्लेष्य न हरेत् तत् समासतः विरुद्धं ॥
(अ.ह.सू. 7/45)

यत किञ्चित् दोषमुत्क्लिश्य भुक्तं कोपान्न निर्हरित् ।
रसादीष्वयथार्थं वा तद्विकाराय कल्पते ॥
(सु.सू. 20/20)

The foods, drinks or drugs which aggravates Doshas but do not expel them out of the body is called Viruddhahara or Ahita (incompatible).

Types of Viruddhahara

यच्चापि देशकालअग्निमात्रासात्म्यानिलादिभिः ।
संस्कारतो वीर्यतश्च कोष्ठावस्थाक्रमैरपि ॥
परिहारोपचराभ्यां पाकात् संयोगतोऽपि च ।

विरुद्धं तच्च न हितं हृत्संपद्धिभिश्च यत ॥
(च.सू. 26/86-87)

Desha, Kala, Agni, Matra, Satmya, Dosha, Samskara, Virya, Koshtha, Avastha, Krama, Parhara, Upacara, Paka, Samyoga, Hruda, Sampat, Vidhi Viruddha total eighteen types of Viruddhahara.

1. Desha Viruddha

विरुद्धं देशतस्तावद्रूक्षतीक्ष्णादि धन्वनि ।
आनूपे स्निग्धशीतादि भेषजं यन्निषेव्यते ॥
(च.सू. 26/88)

Intake of Ruksha and Tikshna substance in Jangala Desha and Sheeta and Snigdha substance in Anupa Desha is Desha Viruddha.

Jangala Desha is dry with less water, so all living animals, human in that area are Vata predominant in nature if consume Ruksha, Tikshna food and drugs it leads aggravation of Vata.

Anup Desha is excessive water, Snigdha Guna is more, and so people are afflicted with Kapha disorder. If they consume more Snigdha, Sheeta food and medicine it leads Kapha diseases.

2. Kala Viruddha

कालतोऽपि विरुद्धं यच्छीतरूक्षादिसेवनम् ।
शीतेकाले, तथेष्णो च कटुकोष्णादिसेवनम् ॥
(च.सू. 26/89)

Consuming Sheeta and Ruksha food in winter season, Katu and Ushna food in summer season is Kala Viruddha.

3. Agni Viruddha

विरुद्धमनले तद्वदन्नपानं चतुर्विधे ।
(च.सू. 26/90)

Intake of Guru Ahara when there is Mandagni, Laghu Ahara when Agni is Teekshnagni (strong) is Agni Viruddha. Similarly intake of food at various with irregular and normal power of digestion falls under this category.

4. Matra Viruddha

मधुसर्पिः समघृतं मात्रया तद्विरुध्यते ।
(च.सू. 26/90)

Taking of honey and ghee in equal quantity is Matra Viruddha.

5. Satmya Viruddha

कटुकोष्णादिसात्प्यस्य स्वादुशीतादिसेवनम् ।
यत्तत सात्प्यविरुद्धं तु.....
(च.सू. 26/91)

The use of Madhura, Sheeta food for a person, who is accustomed to Katu, Ushna food, it is contradictory.

6. Dosha Viruddha

.....विरुद्धं त्वनिलादिभिः ।
या समानगुणाभ्यासविरुद्धत्रौषधक्रिया ॥
(च.सू. 26/91)

Use of diet, drug and behaviour similar to Doshas in properties but adverse to the persons practice is antagonistic to Doshas.

7. Samskara Viruddha

संस्कारतो विरुद्धं तद्यद्भोज्यं विषवद्भवेत् ॥
एरण्डीसीसकासक्तं शिखिमांसं यथैव हि ।
(च.सू. 26/93)

Drugs and diet when prepared in particular way produce poisoning effects like in case Shikhi Mamsa (peacock meat) attached to castor stick, it is known as antagonistic in processing.

8. Virya Viruddha

विरुद्धं वीर्यतो ज्ञेयं वीर्यतः शीतलात्मकम् ॥
तत संयोज्योष्णवीर्येण द्रव्येण सह सेव्यते ।
(च.सू. 26/94)

Antagonism in potency is that when Sita Virya and Ushna Virya combined together are taken. Chilacima variety of fish with milk.

9. Koshtha Viruddha

क्रूरकोष्ठस्य चात्यल्पमन्दवीर्यमभेदनम् ॥
मदुकोष्ठं गुरुचभेदनीयं तथा बहु । एतत्कोष्ठविरुद्धं तु,
(च.सू. 26/95)

Administration of a mild purgative in a small dose for a person of with Krura Koshtha (hardbowel) and administration of strong purgatives food for a person with Mrudu Koshtha (soft bowel).

10. Avastha Viruddha

.....विरुद्धं स्यादवस्थया ॥
 श्रम व्यवाय व्यायामसक्तस्यानिल कोपनम् ।
 निद्रालस्यालस्य भोजनं श्लेष्मकोपनम् ॥
 (च.सू. 26/96)

When Vata vitiating substance is given to the person, Shrama (indulge excessive) Vyayama (physical work), Vyavaya (sexual intercourse) and Kapha vitiating substance and indulge in Nidra (oversleep) and Alasya (laziness) it is antagonism in respect of health condition.

11. Krama Viruddha

यच्चानुत्सृज्य विण्मूत्रं भुङ्क्ते यश्चाबुभुक्षितः ।
 तच्च क्रमविरुद्धं स्याद्यच्चातिक्षुब्धशानुगः ॥
 (च.सू. 26/97)

If a person takes food before his bowel and urinary bladder are clear (empty) or when he does not have appetite or after his hunger has been highly aggravated.

12. Parihara Viruddha

परिहारविरुद्धं तु वाराहादीन्निषेव्य यत ।
 (च.सू. 26/98)

Eating hot things after intake of pork etc. It is known as antagonism in indication.

13. Upachara Viruddha

सेवेतोष्णघृतादेश्चपीत्वाशीतं निषेवते ॥
 (च.सू. 26/98)

Cold things after intake of ghee etc. It is known as antagonism in contraindication.

14. Paka Viruddha

विरुद्धं पाकतश्चापि दुष्टदोर्दारुसाधितम् ।
 अपक्वतण्डुलात्यर्थपक्वदग्धं च यद्भवेत् ॥
 (च.सू. 26/99)

Caused by variance with Paka etc. Preparation of food with bad or rotten food under cooling or over cooling or burning during the process of preparation.

15. Samyoga Viruddha

Caused by combination of two or more substance is called Samyoga Viruddha.

संयोगतो विरुद्धं तद्यथाऽम्लं पयसा सह ।
 (च.सू. 26/99)

Caused by combination of two or more substance is called Samyoga Viruddha. This combination results in the manifestation of specific toxic properties, which cannot be manifested by individual substances. Intake of Amla Ahara with milk is an example of Samyoga Viruddha.

16. Hrudaviruddha

अमनोरुचितं यच्च हृद्विरुद्धं तदुच्यते ॥
 (च.सू. 26/100)

Any substance which is not pleasant in taste causes Hrudaviruddha. Here Hrudaviruddha one should take Mana.

सौमनस्यं बलं पुष्टिमुत्साहं हर्षणं सुखम् ।
 स्वादु संजनयत्यन्नमस्वादु च विपर्ययम् ॥
 (सु.सू. 46/481)

Sushruta mentioned Asvadu and Svadu Ahara and told that tasty foods best pleasantness of mind, Bala, Pushti, Utsaha, Harshana and Sukha. Whereas food which are not tasty gives rise to the opposite qualities.

17. Sampat Viruddha

संपद्विरुद्धं तद्विद्यादसंजातरसं तु यत ॥
 (च.सू. 26/101)

The food substances which are not matured or over matured or putrefied are the example of Sampat Viruddha.

18. Vidhi Viruddha

अतिक्रान्तरसंवाऽपि विपन्नरसमेव वा ।
 ज्ञेयं विधिवेरुद्धं तु भुज्यते निभृतेन यत ॥
 (च.सू. 26/86-101)

The rules of diet not following called Vidhi Viruddha. Example- taking meals in unhygienic place or while talking or laughing etc.

Incompatible foods

आनूपमामिषं माषक्षौद्रक्षीरविरुद्धकैः ।
 विरुध्यते सह बिसैर्मूलकेन गुडेन वा ॥
 विशेषात्पयसा मत्स्या मत्स्येष्वपि चिलीचिमः ।
 (अ.ह.सू. 7/30)

The use of Masha, Madhu, Ksheera, Virudhaka, Bisa, Mulaka, Guda is incompatible with the meat of marshy land. Especially the use of fish meat with milk is incompatible, and among fish the Cilicima variety of fish is most incompatible.

विरुद्धमलं पयसा सह सर्वं फलं तथा ।
तद्वत् कुलत्थवरकङ्गुवल्लमकुष्ठकाः ॥
(अ.ह.सू. 7/31)

The use of Amla (all sour substances) is incompatible with Paya (milk). Similarly the fruits too are incompatible with Paya (milk). The Kulattha, Varaka, Kangu, Valla and Makusthaka are also Viruddha (incompatible) with it.

भक्षयित्वां हरितकं मूलकादि पयस्त्यजेत ॥
(अ.ह.सू. 7/32)

After eating Mukaladi and Haritaka (green leafy vegetables), drinking of Paya milk should be avoided.

मत्स्यनिस्तलनस्नेहे साधिताः पिप्पलीस्त्यजेत ।
कांस्ये दशाहमुषितं सर्पिरुष्णं त्वरुष्करे ॥
(अ.ह.सू. 7/37)

The Pippali processed with the residual oil or ghee of frying fish should not used in any work. The ghee placed ten days in bronze vessel and warm potent substances with Arushkara (Bhallataka) should be avoided.

एकद्वयं पायससुराकृशराः परिवर्जयेत ।
मधु सर्पिर्वसातैलपानीयानि द्विशस्त्रिंशः ॥
एकत्र वा समांशानि विरुध्यन्ते परस्परम् ॥
(अ.ह.सू. 7/38)

The Payasa (milk), Sura (wine) and Krushara should not be taken together. The Madhu (honey), Sarpi (ghee), Vasa (fat), Taila (oil), Paniya (water) etc. used in equal proportion together in their association of two, three or all of them is incompatible with each other.

Diseases Occurs by Intake of Viruddha Ahara

पाण्ड्यान्धवीसर्पदकोदराणां विस्फोटकोन्मादभगन्दराणाम् ।
मूर्च्छामदाध्मानगलग्रहाणां पाण्ड्वामयस्यामविषस्य चैव ॥
किलासकुष्ठग्रहणीगदानां शेषाम्लपित्तज्वरपीनसानाम् ।

सन्तानदोषश्च तथैव मृत्योर्विरुद्धमन्नं प्रवदन्ति हेतुम् ।
(च.सू. 26/102-103)

Intake of Viruddha Ahara is responsible for the Shandya (impotency), Andhya (blindness), Visarpa, Jalodara, Visphota, Unmada, Bhagandara, Mada, Adhmana, Galagraha, Pandu, Amaya, Kilasa, Kushtha, Grahani, Gada, Shotha, Amlapitta, Jwara, Peenasa, Santana Dosha and even Mrutyu (death).

एषां खल्वपरेषां च वैरोधिकनिमित्तानां व्याधीनामिमे भावाः
प्रतिकारा भवन्ति । तद्यथा—वमनं विरेचनं च, तद्विरोधिनां च
द्रव्याणां संशमनार्थमुपयोगः, तथाविधैश्च द्रव्यैः पूर्वमभिसंस्कारः
शरिरस्येति ॥ (च.सू. 26/104)

These are measures, which are used to counteract the above and the disorder caused by antagonistic. Diseases caused by the intake of Viruddha Ahara can be cured by Vamana (emesis), Virechana (purgation) or administration of antidotes and by taking prophylactic measures.

Treatment for diseases occur due to Viruddha Ahara

विरुद्धाशनजान रोगान प्रतिहन्ति विरेचनम् ।
वमनं शमनं चैव पूर्वं वा हितसेवनम् ।
सात्म्यतोऽल्पतया वाऽपि दीप्ताग्नेस्तरुणस्य च ।
स्निग्धव्यायामबलिनां विरुद्धं वितथं भवेत् ॥
(च.सू. 26/105-106)

Virechana (Purgation), Vamana (emesis), Tadvirodhanam (antidotes) and Samshana (prophylaxis) these four cure the diseases caused by the intake of Viruddha Ahara. The diseases caused by Viruddhashana (incompatible food) are managed by Virechana (purgation), Vamana (emesis), Shamana (palliation) and Purva Hitasevana (prophylaxis). Viruddha Ahara does not produce any effect in Satmyata (habitual incompatible food), Alpataya (less quantity), Diptagni (strong digestive fire), Taruna (young), Snigdha (who has taken oleation), Vyayama (physical exercise) and Balavana (strong).

Non harming of Viruddha Ahara (Affectlessness of incompatible)

व्यायामस्निग्धदीप्ताग्रिवयः स्थबलशालिनाम् ।
विरोध्यपि न पीडाये सात्म्यमल्पं च भोजनम् ॥
(अ.ह.सू. 7/30)

The incompatible food does not affect the people who regularly do Vyayama (exercise), who take Snigdha Ahara and who have good Dipta Agni (digestive power), who are Vaya (young) and Balashalina (good physical and mental strength). Viruddha Ahara doesn't affect if it has become Satmya (accustomed) and taken in Alpa (little quantity).

Food Poisoning and Ama Visha

Food Poisoning

It occurs by consumption of food, which is contaminated by bacteria and is stored or cooked incorrectly.

The most common types of bacteria are :

- a) **Staphylococi** : They multiply in food and produce a poisonous substance toxin.
- b) **Salmonellae** : They multiply in bowel and cause dysentery like illness. Salmonealla is infectious and can spread through poor personal and kitchen hygiene.

Sign and Symptoms

a) Staphylococcal poisoning

The following sign and symptoms appear within two to six hours of eating the contaminated food :

- + Nausea and vomiting
- + Headache
- + Abdominal pain
- + Diarrhoea
- + Symptoms and signs of shock

b) Salmonella Poisoning

They appear within few hours of eating the food or are delayed for a day or two.

- + Fever
- + Nausea and vomiting
- + Diarrhoea
- + Abdominal pain
- + Signs and symptoms of shock

Treatment

1. Keep the patient at rest

2. Give plenty of fluids to drink
3. Induce vomiting
4. Gastric lavage
5. Purgatives ex. lactulose
6. Use of antibiotics

ex. in Salmonella– Chloromphenicol 1-3 gm/ daily in 4 divided dose

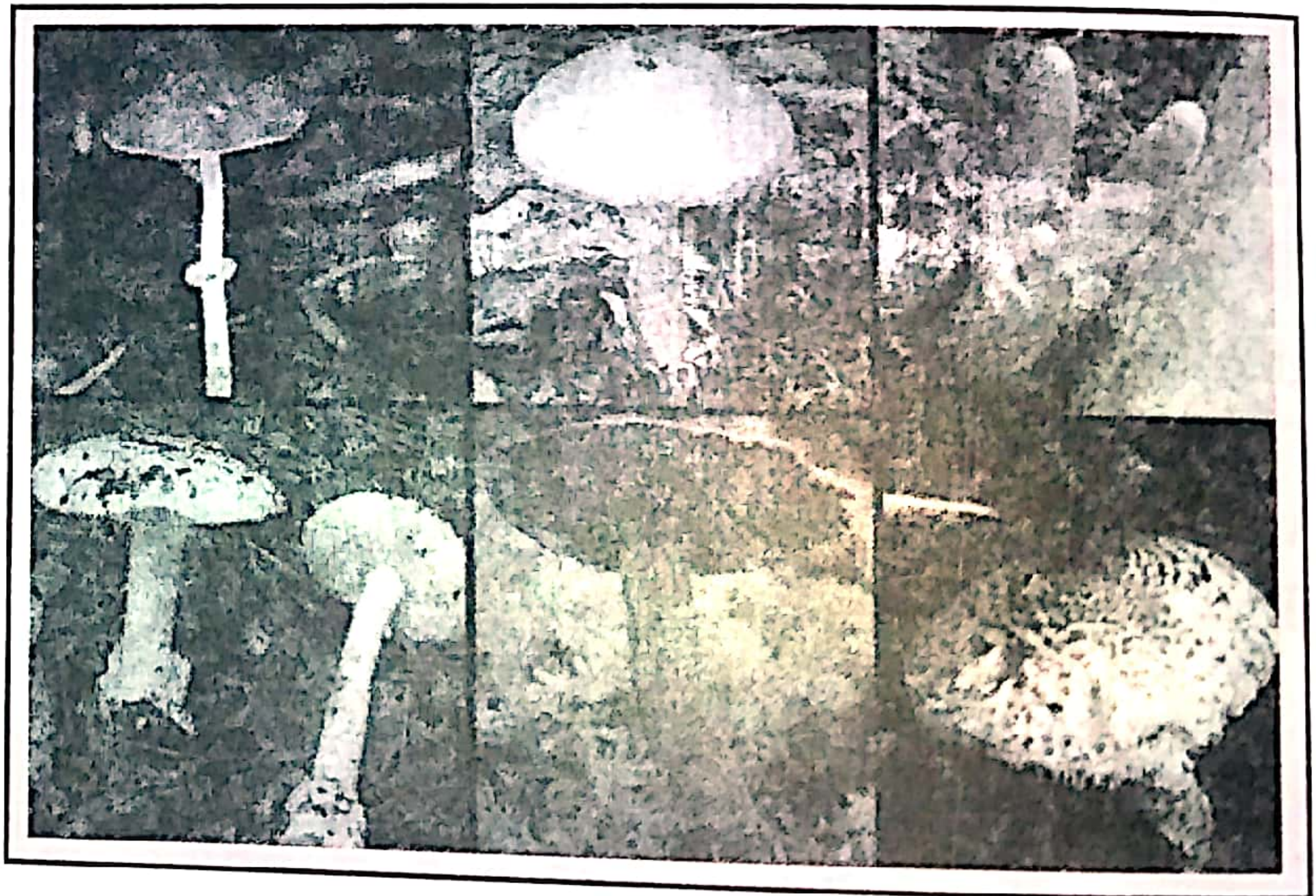
Ampicillin 0.5-2 gm/daily IV 6 Hrly.

Post-mortem appearance

1. Mucosa of GIT are inflamed, congested and ulcerated.
2. Internal organ congestion
3. Causative organism is isolated from visera
4. Fatty degeneration of liver.

Mushroom poisoning

Depending on the toxic principal present in he particular species, at least 3 types of mushroom poisoning is known :



1. Muscarine type (early mushroom poisoning)

- Due to Inocybe and related species.
- Symptoms are sweating, salivation, nausea, vomitting, diarrhoea, abdominal pain etc..
- T/t of choice is atropine.

2. Hallucinogenic type

- It is due to muscimol and other isoxazole compounds which are present in A. Muscaria.
- These isoxazole compounds activate amino

acid, receptors, and block muscarine receptor in brain; and have hallucinogenic property.

- Symptoms : ataxia, abnormal movement, tonic-clonic seizures, hysteria etc.
- Treatment : Diazepam, Lorazepam, Midazolam.

Food Safety and Standards Authority of India (FSSAI)

Food Safety and Standards Authority of India (FSSAI) is a statutory body established under the Ministry of Health & Family Welfare, Government of India. The FSSAI has been established under the Food Safety and Standards Act, 2006, which is a consolidating statute related to food safety and regulation in India.

FSSAI is responsible for protecting and promoting public health through the regulation and supervision of food safety.

It works on Food Safety and Standards (Packaging and Labelling) Regulation, 2011 and Food Safety and Standards (Contaminants, Toxins, and Residues) Regulations, 2011.

The FSSAI has prescribed standards for the following:

1. Dairy products and analogues
2. Fats, oils and fat emulsions
3. Fruits and vegetable products
4. Cereal and cereal products
5. Meat and meat products
6. Fish and fish products
7. Sweets & confectionery
8. Sweetening agents including honey and Salt, spices, condiments and related products
9. Beverages, (other than dairy and fruits & vegetables based)
10. Other food product and ingredients
11. Proprietary food
12. Irradiation of food
13. Fortification of staple foods i.e. vegetable oil, milk, salt, rice and wheat flour/maida.

The development of standards is a dynamic

process based on the latest developments in food science, food consumption pattern, new food products, and additives, changes in the processing technology leading to changed specifications, advancements in food analytical methods, and identification of new risks or other regulatory options.

Amavisha

विरुद्धाध्यशनाजीर्णाशनशीलिन; पुनरामदोषमामविष-
मित्याचक्षते भिषजः, विषसदृशलिङ्गत्वात्; तत् परमसाध्यम्,
आशुकारित्वादिरुद्धोपक्रमत्वाच्चेति ॥ (च.वि. 2/12)

Amadosha of an individual habited Viruddha Ahara (incompatible food), Adhyashana (food before the digestion of the previous meal) and Ajirnashana (uncooked food) is considered as Amavisha (a condition characterized by the manifestation of toxic symptoms due to indigestion), the manifestations of this condition resemble those of the poisoning. This is absolutely Asadhya (incurable) because of the acuteness and also the contraindication involved in the line of treatment of this condition.

Signs and symptoms

तस्य लिङ्गमजीर्णस्य विष्टम्भः सदनं तथा ।
शिरसो रुक् च मूर्च्छा च भ्रमः पृष्ठकटिग्रहः ॥
जृम्भाऽङ्गमर्दस्तृष्णा च ज्वरश्छर्दिः प्रवाहणम् ।
अरोचकोऽविपाकश्च, घोरमन्नविषं च तत् ॥

(च.चि. 15/45-46)

- Vishtambha or Aprachalana Rupatatha or Avastham- Residing at one site.
- Sadana- Feeling physical and mental discomfort
- Shirasa Ruk - Headache,
- Murccha - Consciousness,
- Bhrama - Giddiness
- Prushta Katigraha - Stiffness of back and lumbar region
- Jrumbha - Yawning
- Angamarda - Body ache or malaise
- Trushna - Thirst
- Jwara - Fever

- Chardhi - Vomiting
- Pravahana - Tenesmus
- Arochaka - Anorexia
- Avipaka - Indigestion and it is similar to Anna Visha (antigenic poison).

Associated disorders of Annavisha

संसृज्यमानं पित्तेन दाहं तृष्णां मुखामयान् ।
जनयत्यम्लपित्तं च पित्तजांश्चापरान् गदान् ॥
यक्ष्मपीनसमेहादीन् कफजान् कफसङ्गतम् ।
करोति वातसंसृष्टं वातजांश्च गदान् बहून् ॥
मूत्ररोगांश्च मूत्रस्थं कुक्षिरोगान् शकृद्गतम् ।
रसादिभिश्च संसृष्टं कुर्याद्रोगान् रसादिजान् ॥
(च.चि. 15/47-49)

The Anna Visha when associated with Pitta causes Daha (burning sensation), Trushna (thirst), Mukha Amaya (oral diseases), Amlapitta (DecueiegCeese fÀÚegb efhellece - the Amla Guna of Pitta gets increase) and Pittaja Vikara (various other pitta related disorders). The same Anna Visha when gets associated with Kapha it leads to condition like Yakshma (pthiasis), Pinasa (coryza) and Prameha (diabetes) and various other Kaphaja disorders. Whereas several Vatika diseases are caused by association of Vata with the Anna Visha. The Anna Visha when enters into Mutra Marga (renal system), causes Mutra Roga (urine related disorders occur), similarly, Kukshigata Roga (ailments related to abdomen) have their origin while Shakruta (faeces) is involved. Rasadi Pradasaja Vikara (tissue related ailments) occur when Rasadi Srotas are involved.

Management of Ama Pradosha (Charaka Vimana 2/13)

The curable variety of Ama Dosha should be eliminated through emesis, by administering warm saline water and thereafter fomentation and application of suppositories while the patient is kept on fasting.

In case of Visuchika, treatment should start with

Langhana measures (therapy that reduces heaviness in the body) and specific dietary regimen as followed after therapeutic purgation.

If in the state of vitiation of ama, the patient has finally digested the previously eaten meal, but while ingesting the present meal, if the dosha still adhere inside the stomach and the feeling in the abdomen is cold/ inactive, heavy and aversion to food, then the patient should be advised medicines for digestion of the remaining dosha (Pachana drugs) and also for stimulation of digestive fire (Deepana drugs). The patient should not be given food during indigestion since the Agni (digestive power) which is already weak by excessive vitiation of ama is incapable of simultaneously digesting the dosha, the drug and the diet. In a patient who is already weak and has low digestive ability, the cumulative effect of excessively morbid Ama (Ama Pradosha), food and drug will further deplete the strength of the patient and could even lead to death.

The amelioration of diseases caused by ama is done by Apatarpana (depletion therapy). If the disease further progresses even after depletion therapy, appropriate measures should be adopted to counter the morbid condition. Experts recommend the use of measures antagonistic to both the disease as well as its etiological factors, especially medications that could treat them both.

When the patient is relieved from excessive morbidity of Ama, the Dosha are in completely digested form and once his digestive fire has been rekindled/restored, he should be administered, systematically and skilfully, measures such as oleation, corrective and unctuous enema (Asthapana and Anuvasana types of Basti), and appropriate internal administration of unctuous substances following the specific procedure after careful assessment of the status of dosha, drugs, place, time, strength, body, diet, Satmya, psyche, constitution, age etc. and also the diseases .

Syllabus

1. Garavisha
2. Dooshivisha
3. Contemporary aspects of garavisha and dooshivisha.
4. Role of garavisha and dooshivisha in the manifestation of diseases
5. Research updates in garavisha and dooshivisha

Learning objectives

1. Describe the various definitions of garavisha.
2. Describe the clinical presentations of garavisha.
3. Understand and explain the management principles of garavisha.
4. Describe the various definitions of dooshivisha.
5. Describe the clinical presentations of dooshivisha.
6. Describe the principles of management of dooshivisha.
7. Discuss the application of the concept of dooshivisha and garavisha and its management in day to day clinical practice.
8. Discuss the recent research updates in the concept of garavisha and dooshivisha.
9. Describe garavisha and dooshivisha as an etiology for the diseases of present era.

Total - 9 hours (Lecture :07 hour, Non-lecture: 02 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- Yes

Gara Visha

गरसंयोगजं चान्यद्गरसंज्ञं गदप्रदम् ।
कालान्तरविपाकित्वान्न तदाशु हरत्यसून् ॥
(च.चि. 23/14)

There is another variety of poison called Gara Visha which is prepared artificially by the combination of various substances. It produces various diseases. Since it takes time to get metabolized and to produce its toxic effects, it does not cause instantaneous death of a person.

गरं तु द्विविधं- निर्विषद्रव्यसंयोगकृतं, तथा सविषद्रव्य-संयोगकृतं च-

Gara Visha is of two types :

- निर्विषद्रव्यसंयोगकृतं- Combination of non-poisonous substance.

- सविषद्रव्यसंयोगकृतं- Combination of poisonous substance.

संयोगजं च द्विविधं तृतीयं विषमुच्यते ।
गरं स्यादविषं तत्र सविषं कृत्रिमं मतम् ॥
नानाप्राण्यङ्गशमलविरुद्धौषधिभस्मनाम् ।
विषाणां चाल्पवीर्याणां योगो गर इति स्मृतः ॥

(अ.ह.उ. 35/49-50)

Garavisha is the artificial poison obtained by combination of parts of the bodies, excreta of different animals, incompatible herbs, ashes and poisonous substances of mild potency.

Gara Visha Prayoga (slow acting artificial poison)

सौभाग्यार्थं स्त्रियः स्वेदरजोनानाङ्गजान्मलान् ।

शत्रुप्रयुक्तांश्च गरान् प्रयच्छन्त्यन्नमिश्रितान् ॥
(च.चि. 23/233)

With the view to gain the favour and to get control over their own peoples the, women administer to them their Sweda (sweat), Raja (menstrual discharge), Sharira Mala (saliva and excreta) from other parts of the body and also the Gara (artificial poison) prepared by Shatru (enemies), mixing these with the food.

Gara Visha Lakshana

तैः स्यात् पाण्डुः कृशोऽल्पाग्निर्गर्शस्योपजायते ।
मर्मप्रधमनाध्मानं श्वयथुं हस्तपादयोः ॥
जठरं ग्रहणीदोषो यक्ष्मा गुल्मः क्षयो ज्वरः ।
एवंविधस्य चान्यस्य व्याधेर्लिङ्गानि दर्शयेत् ॥
स्वप्ने मार्जारगोमायुव्यालान् सनकुलान् कपीन् ।
प्रायः पश्यति नद्यादीञ्छुष्कांश्च सवनस्पतीन् ॥
कालश्च गौरमात्मानं स्वप्ने गौरश्च कालकम् ।
विकर्णनासिकं वाऽपि प्रपश्येद्विहतेन्द्रियः ॥
(च.चि. 23/234-237)

The administration of Gara Visha (poison), the following symptoms gets manifest.

- Pandu- Anemia
- Krusha- Emaciation
- Alpa Agni- Weakness of the digestive power
- Marma Pradhamana - palpitation of the heart
- Adhmana- Distension of the abdomen
- Shvayathu Hasta Pada- Edema of hands and feet
- Jathara- Abdominal diseases
- Grahani Dosha
- Gulma
- Kshaya- Depletion of Dhatu
- Jwara- fever and similar other disorders.

Swapna Darshana- Marjara (cats), Gomayu (jackals), Vyala (cruel animals), Nakulana (mongoose) and Kapi (monkey) dream generally dried up rivers or other sources of water and withered trees. The dark complexion, visualizes as bright in dreams and vice versa. That person self in dreams without ears and nose or injured sense organs.

Gara Visha Chikitsa

तमवेक्ष्य भिषक् प्राज्ञः पृच्छेत् किं कैः कदा सह ।
जग्धमित्यवगम्याशु प्रदद्याद्वमनं भिषक् ॥
(च.चि. 23/238)

Seeing such a person, the intelligent physician should ask what kind of food, when and in whose company later to that indicated to had eaten and thus ascertain the cause of Gara so that it can be avoided, administer emesis therapy.

Swarna Tamra Bhasma Prayoga

सूक्ष्मं ताम्रजस्तस्मै सक्षौद्रं हृद्विशोधनम् ।
शुद्धे हृदि ततः शाणं हेमचूर्णस्य दापयेत् ॥
हेम सर्वविषाण्याशु गरांश्च विनियच्छति ।
न सज्जते हेमपाठे विषं पद्मदलेऽम्बुवत् ॥
(च.चि. 23/239-240)

Ingredients and method of preparation-

Induces Vamana (emesis), then administer with one Shana Matra (three grams) of Suvarna Bhasma. Suvarna Bhasma quickly destroys all poisons even Gara Visha. Just as water fallen on lotus leaves cannot wet it. Fine powder of copper mixed with honey is shall be administered first for Hrid Shodhana or Hridayavarana.

Indication- Visha cannot destroy a person in whom with Swarna Bhasma is administered.

Nagadantyadi Ghrita-

नागदन्तीत्रिवृहन्तीद्रवन्तीस्नुकूपयः फलैः ।
साधितं माहिषं सर्पिः सगोमूत्राढकं हितम् ॥
सर्पकीटविषार्तानां गरार्तानां च शान्तये ।
(च.चि. 23/241)

Ghee obtained from buffalo's milk and processed with Nagadanti or Danti Bheda, Trivruta, Danti, Dravanti, Snukpaya, Phala or Madana Phala and one Adhaka of cow urine is an effective remedy in case of poison due to snake and insect bite and in Gara Visha.

Amrita Ghrita- (Cha. Chi 23/ 242-249)

Ingredients and method of preparation- One Adhaka of Ghrita (ghee) processed following common method of preparation by adding the paste of one Aksha each of bark of Shirisha Twaka, Shunthi, Pippali, Maricha, Triphala, Chandana,

Utpala, Bala, Atibala, Sariva, Asphota or Aparā Mallika, Surabhi or Parnasa Bheda, Nimbi, Patala, Bandhujiva or Putrajivaka, Adhaki, Murva, Vasa, Surasa, Vatsaka, Patha, Ankola, Ashwagandh, Arkamula, Yashtimadhu, Padmaka, Vishala, Bruhati, Laksha, Kovidara, Shatavari, Katabhi, Danti, Apamarga, Prushniparni Rasanjjana, Shwetabhanda, Ashvakhuraka or Kokilaksha, Kushta, Daru, Priyangu, Vidari, Madhuka, Sara, Karanja Phala, bark Haridra, Daruharidra and Lodhra, two Adhaka of water, three Adhaka of cows urine and goats urine each. This recipe cures Visha (poison), Apasmara (epilepsy), Kshaya (depletion of Dhatu), Unmada (insanity), Gara, Udara, Pandu (anemia), Krimi (parasitic infestation), Gulma, Pleeha (splenic disorders), Stambha (stiffness of thighs), Kamala (jaundice), Hanu Skandha Graha (stiffness of jaws and shoulders).

Indications- This formulation is when used in the form of Pana (drink), Abhyanga (massage) and Navana (inhalation therapy). It helps in the revival of persons who appear to be dead due to poisons and hanging. This combination is called as Amrita Ghrita and is best suited in all cases of poisoning.

Dooshivisha

दूषी- 'दूष' धातु + 'णिच्' प्रत्यय

It meaning Impure, bad or spoiled.

यत् स्थावरं जङ्गमकृत्रिमं वा देहादशेषं यदनिर्गतं तत् ।
जीर्णं विषघ्नौषधिभिर्हतं वा दावाग्निवातातपशोषितं वा ॥
स्वभावतो वा गुणविप्रहीनं विषं हि दूषीविषतामुपैति ।
दीर्घाल्पभावान्न निपातयेत्तत् कफावृतं वर्षगणानुबन्धि ॥
(सु.क. 2/25-26)

Poison whether Sthavara, Jangama or Kritrima, which has not gone out of the body completely without leaving any residue, that poison which is very old, inactivated by anti-poisonous things, that which is evaporated (destroyed partially) by forest fire, wind and sun; that which by nature is poor in its qualities, attain the name Dushivisha (impoverished/ impotent/ weak poisons); because of poor potency it does not kill the person quickly and remains in the body for many years covered by Kapha.

दूषी विष निदान

दूषितं देशकालान्नदिव्यास्यचैरपीक्षणाः ।
यस्माद् दूषयते धातूस्तस्माद् दूषीविषं स्मृतम् ॥
(सु.क. 2/33)

Since it becomes vitiated (exacerbated) often by Desha (habitat), Kala (season), Anna (food) and Divaswapna (day-sleep) and since it vitiates the Dhatus (tissues) also, it is called Dushi Visha (vitiating poison).

दूषीविष पूर्वरूप

निद्रा गुरुत्वं च विजृम्भणं च विश्लेषहर्यावयवाऽङ्गमदः ।
(सु.क. 2/30)

Premonitory symptoms it produces; Nidra (more of sleep), Gurutva (feeling of heaviness of the body), Jrumbha (more of yawning), Vishlesha Harsha Avathaca Angamarda (looseness of joints, tingling or diffuse pain in the body).

दूषीविष लक्षण

दूषीविषं तु शोणितदुष्ट्यारुःकिटिभकोठलिङ्गं च ।
विषमेकैकं दोषं संदूष्य हरत्यसूनेवम् ॥
(च.चि. 23/31)

Dushi Visha (a type of artificial poison) vitiates Shonita (blood) and produces symptoms like Aru (eczema in the head), Kitibha (psoriasis) and Kotha (urticaria). This type of poison afflicts each one of the Dosha and causes death of the patient.

ततः करोत्यन्नमदाविपाकावरोचकं मण्डलकोठमोहान् ॥
धातुक्षयं पादकरास्यशोफं दकोदरं छर्दिमथातिसारम् ।
वैवर्ण्यमूर्च्छाविषमज्वरान् वा कुर्यात् प्रवृद्धां प्रबलां तृषां वा ॥
उन्मादमन्यज्जनयेत्तथाऽन्यदानाहमन्यत् क्षपयेच्च शुक्रम् ।
गाद्वद्यमन्यज्जनयेच्च कुष्ठं तांस्तान् विकारांश्च बहुप्रकारान् ॥
(सु.क. 2/30-32)

In the next stage it creates toxicity of foods (Anna Mada); Avipaka (indigestion), Arochaka (loss of taste), Mandala Kotha (appearance of round patches and rashes on the skin), Moha (delusion), Dhatu Kshaya (decrease or loss of tissues), Pada Kara Asya Shopha (swelling of the feet, hands and face), Ukodara (ascites), Chardi (vomiting) and Atisara (diarrhoea); when greatly increased it produces Vaivarnya (discolouration of the body), Murccha (fainting), Vishama Jwara (irregular

fever) and profound Trishan (thirst); some kinds produce Unmada (insanity), some others produce Anaha (flatulence), some others cause Shukra Kshaya (decreases of semen), some cause Gadagada (stammering), yet others produce Kushta (leprosy and other skin diseases) and also many diseases of various kinds.

दूषीविष लक्षण

तेनार्दितो भिन्नपुरीषवर्णो विगन्धवैरस्यमुखः पिपासी ।
मूर्च्छन् वमन् गदगदवाग्विषण्णो भवेच्च दूष्योदरलिङ्गजुष्टः ॥
आमाशयस्थे कफवातरोगी पक्वाशयस्थेऽनिलपित्तरोगी ।
भवेन्नरो ध्वस्तशिरोरुहाङ्गो विलूनपक्षस्तु यथा विहङ्गः ॥
स्थितं रसादिष्वथवा यथोक्तान् करोति धातुप्रभवान् विकारान् ।
कोपं च शीतानिलदुर्दिनेषु यात्याशु, पूर्वं शृणु तत्र रूपम् ॥
(सु.क. 2/27-29)

The person suffering from this, will be having Bhinna Purisha (loose motions), Varna (change of colour), Vigandha (bad smell) and Vairasya (taste in the mouth), Pipasa (profound thirst), Murccha (fainting), Vamana (vomiting), Gadagada (stammering), grief stricken, timid and symptoms of Dushyodara.

When the (poison) is in the Amashaya (stomach) he becomes a patient of diseases of Kapha and Vata origin; when present in Pakvashaya (large intestine) he is a patient of diseases of Vata and Pitta origin; the person has shedding of the hairs of the head and body and appears just like a bird which has lost the feathers of its wings; when staying in rasa and other Dhatus (tissues) it gives rise to diseases due to abnormalities of the Dhatus (tissues), gets exacerbated quickly during cold season, heavy breeze and sunless days.

दूषी विष चिकित्सा

दूषी विष पंचकर्म चिकित्सा

दूषीविषेऽथ रक्तस्थिते सिराकर्म पञ्चविधम् ॥
(च.चि. 23/63)

If the Visha is located in Rakta Sthana or if afflicted with Dushi Visha then administer with Sira Vyadhana (bloodletting) and Panchakarma.

दूषीविषार्तं सुस्विन्नमूर्ध्वं चाधश्च शोधितम् ।
पाययेतागदं नित्यमिमं दूषीविषापहम् ॥
(meg.keg. 2/50)

The person suffering from effects of Dushi Visha (weak/ impoverished poison) should be given Swedana (sudation) greatly, purified both in upper and lower (vomiting and purgation) then be made to consume Agada (anti-poisonous recipe) to remove the poison.

दूषीविषारि अगद

पिप्पल्यो ध्यामकं मांसी शावरः परिपेलवम् ।
सुवर्चिका ससूक्ष्मैला तोयं कनकगैरिकम् ॥
क्षौद्रयुक्तोऽगदो ह्येष दूषीविषमपोहति ।
नाम्ना दूषीविषारिस्तु न चान्यत्रापि वार्यते ॥
(सु.क. 2/51-52)

Pippali, Dhyamaka, Mamsi, Shavara (Lodhra), Paripelava, Suvarcika, Suksmaila, Toya (Valaka) and Kanakagairika (Svarna Gairika) these should be made into powder (or decoction) and administered mixed with Madhu (honey); this known as Dushivishari Agada destroys weak poisons; it is not forbidden from use in other poisons also.

दूषी विष उपद्रव and चिकित्सा

ज्वरे दाहे च हिक्कायामानाहे शुक्रसंक्षये ।
शोफेऽतिसारे मूर्च्छायां हृद्रोगे जठरेऽपि च ॥
उन्मादे वेपथौ चैव ये चान्ये स्युरुपद्रवाः ।
यथास्वं तेषु कुर्वीत विषघ्नैरौषधैः क्रियाम् ॥
(सु.क. 2/53-54)

Complications such as Jwara (fever), Daha (burning sensation), Hikka (hiccup), Anaha (flatulence), Shukra Kshaya (loss of semen), Shopha (oedema), Atisara (diarrhoea), Murccha (fainting), Hruda Roga (heart diseases), Jathara (enlargement of the abdomen), Unmada (insanity), Vepathu (rigors) or any other complications (produced by weak poisons) should be appropriately treated along with use of Vishaghna Aushadha (anti-poisonous recipes).

साध्यासाध्यता and दूषी विष

साध्यमात्मवतः सद्यो याप्यं संवत्सरोत्थितम् ।
दूषीविषमसाध्यं तु क्षीणस्याहितसेविनः ॥
(सु.क. 2/55)

- साध्य - Diseases produced by weak poisons is curable quickly in persons who are self-controlled;
- याप्य - Those which are persisting for more than one year
- असाध्य - Persons who are emaciated and who indulge in unsuitable food and activities.

Contemporary Aspects of Garavisha and Dushivisha

Ayurveda gives more weightage to the life style and dietary care than the drug therapy. Here comes two popular concepts of Ayurveda i.e., Gara Visha and Dushi Visha, which in turn may be made responsible for the maximum diseases prevalent in today's modernized materialistic world as underlying cause and pathogenesis. By looking superficially these two concepts especially the Gara Visha may be prompted to be sceptical and superstitious. Similar is in the case of Dushi Visha also. But when the modernized society is being looking through and also the modern life style, then it can be concluded that not only these concepts are alive today, but they are more significant from the clinical aspect as most of the diseases prevailing today can be treated successfully on the basis of these two concepts.

Gara Visha is something other than Sthavara and Jangama Visha and it is produced due to the combination of different substances. Chakrapani explains that Gara Visha is combination of Savisha and Nirisha Dravyas. It is always Chirakari, Rogajanaka which does not prove fatal immediately.

Acharya Sushruta has mentioned additionally that these Garayogas cannot only use internally, they are capable of producing of diseases when applied externally. Indu in his commentary states that Gara is a special type of Visha which is usually given along with food and it includes Sakalamapi Vastujaatam i.e. combination of any type of substances. The effect of Gara can be acute subacute, chronic and others viz. Shotha, Pandu, Udara, Unmada etc. contrary to the common belief,

Gara Visha is not only used intentionally, a person can be exposed to Gara Visha accidentally also.

Dushi Visha is such a special concept of Ayurveda that is universally accepted by all most all the Acharyas in general sense the name Dushi Visha indicates its Dushana Swabhava means inside the body the main action is to vitiate Dhatus. It is not a type of poison rather it is a transformatal stage or latent stage which any type of poison can attain.

While the effect of industrialization and commercialization are widely and rapidly spreading in the society, the chances of contacts with toxins are also increasing. With the change in life style of modern civilized man, the risk of getting exposure to the poisons like Gara Visha and Dushi Visha are also increasing day by day. There are so many sectors that can be compared to Gara Visha in today's society, the prevalence of which is very high. The sectors are:

- Adulteration / preservatives
- Cosmetics
- Psychoactive drugs
- Occupational poisoning
- Toxicity by improper preparation of different Bhasmas (nanotoxicology)

Role of Garavisha and Dooshivisha in the Manifestation of Diseases

Garavisha refers to the ingestion or exposure to external toxins or poisons. These toxins can come from various sources such as contaminated food, water, air, or even environmental factors. When Garavisha enters the body, it disrupts the balance of doshas (Vata, Pitta, and Kapha) and disrupts the normal functioning of bodily tissues and systems. The effects of Garavisha can vary depending on the type and quantity of toxins ingested. It can lead to various acute and chronic illnesses, depending on the body's susceptibility and the individual's constitution (Prakriti).

Dushi Visha refers to the internal toxins or endogenous toxins that are generated within the body as a result of incomplete digestion and metabolic processes. Poor digestion, improper diet, and lifestyle choices can lead to the accumulation of Dushi Visha. When Dushi Visha accumulates in the body, it can vitiate the doshas and block the channels (Srotas) responsible for the flow of nutrients and energy. This can lead to the development of various diseases.

The following sectors in present modern world may attribute to Dushi Visha in greater extent.

- Insect bite
- Inanimate poison
- Viruddhahara and Ahitahara
- Fast foods and cold beverages like colas
- Alcohol, tobacco etc.
- Drugs like quinine, NSAIDS, steroids etc.
- Pesticides, heavy metals, minerals, pollutants etc.

In general practice also the most commonly seen disorders now-a-days which can also be a manifestation of Gara Visha and Dushi Visha are,

- Asthma-eczema syndrome
- Urticaria
- Scleroderma
- Skin diseases
- Allergic manifestation
- Auto-immune diseases

Apart from air pollution and water pollution, these are thousands of harmful environmental toxins some of which we are aware of such as pesticides, chemicals, household cleansers, fertilizers etc. These are in generally everyday being absorbed into our body through various means. These toxins are having their effect on different systems of the body. These will not be potent enough to cause acute ill effect, but may cause ill effect after a long duration by getting deposited inside the body. These toxins are nothing but Gara Visha which after a long period of exposure i.e.,

in chronic stage acts like Dushi Visha.

Research Updates in Garavisha and Dooshivisha

A study of relative efficacy of Kautajadi Shilajatu [shilajatu vatak] with Navayas Churna in Garavishajanit Pandu.

Summary - Continues and untimely consuming Viruddhahara for long time there is formation of Garavisha results in Aganimandya leading to Dosha Dusti especially Pitta Dosha and Dhatu Dusti leading to Dhatushaithilya resulting Bala, Varna and Ojakshaya and subsequently manifests as Pandu showing symptoms as Daurbalya, Annadavita, Shrama, Bhrama, Aruchi, Akshikotshotha, Hatprabha etc. Total 30 patients were diagnosed of Garavishajanit Pandu on the basis of subjective and objective parameters and subjected to clinical trials conducted at Bharati Vidyapeeth Medical Foundation's Ayurved Hospital and Research Center, Katraj, Pune. After filling preliminary data and acceptance to informed consent, Enrolled patients were allotted in both groups 15 in each group at random by lottery method and they have received the medicine by single blind method. IEC clearance and Informed consent were taken prior to commencement of study. Trial Group-1(T-1-Kautajadi Shilajatu) and Trial group-2(T-2-Navayasa Churna) were administered respectively Kautajadi Shilajatu and Navayasa Churna at Vyanodane with dose 250mg for 28 days. Appropriately graded Subjective and objective parameters were assessed on weekly basis. Result was noted significant in symptoms Hatanal, Akshikootshotha, Daurbalya, Kopan, Annadvita, Pindikodwesthan, Shram, Hatprabha, Bhram, Gatrashool, Shwas, Aruchi in both groups and also increase in Hb% and Normal RBCs morphology. Group T-1 more effective than Group T-2.

A Study of Efficacy of Tiktak Ghrita in Garavishajanya Vicharchika

Garavishajanya Vicharchika is caused due to consumption of incompatible food for a longer

duration. The symptoms of Vicharchika are Kandu, Raji, Twakvaivarnya, Twakjadyata and Sraav. Acharya Vagbhata mentioned Tiktak Ghrita to treat Garavisha and skin conditions like Kushtha (Vicharchika). In order to find effect of Tiktak Ghrita against these above-mentioned symptoms developed due to Garavishajanya Vicharchika, this study was conducted. 40 patients of incompatible

food consumption were taken for study and are divided in 2 groups. Tiktak Ghrita is more effective to reduce Twak Vaivarnya and Twak Jadyata than Levocetirizine in Garavishajanya Vicharchika. Tiktak Ghrita and Levocetirizine are almost equally effective to reduce Raji and Srava, whereas tab Levocetirizine is more effective to reduce Kandu in Garavishajanya Vicharchika.

Visha Upadrava and Diseases caused due to Exposure to Visha/poisons

Syllabus

1. Visha Upadrava
2. Drug-induced toxicity
3. Occupational hazards.
4. Allergic manifestations
5. Endocrine disrupters

Learning objectives

1. Describe Visha Upadrava
2. Define drug induced toxicity and discuss its Agada Tantra perspective.
3. Discuss the application of principles of Agada Tantra in drug induced hepatotoxicity, nephrotoxicity and neurotoxicity.
4. Discuss various occupational poisons and their health hazards.
5. Discuss the application of principles of Agada Tantra in occupational diseases caused due to pollution, paints, pesticides, fertilizer and other chemicals.
6. Define and discuss allergy, types of allergens and its understanding as per Ayurveda.
7. Discuss the application of the treatment principles of Agada Tantra in various allergic manifestations.
8. Define and enlist endocrine disruptors and discuss its Agada Tantra perspectives.

Total - 6 hours (Lecture :04 hour, Non-lecture: 02 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

Visha Upadrava

विषवेगान्मदमूर्च्छा विषादहृदयद्रवाः प्रवर्तन्ते ।
(च.चि. 23/43)

- Mada- Intoxication
- Murccha- Fainting
- Vishad- Depression
- Hrudadrava- Palpitation

ज्वरकासवमिश्रासहिध्मा तृष्णाऽतिमूर्च्छनम् ।
विशोभेदोऽतिकाठिन्यमानाहो बस्तिमूर्धरूक् ।
श्वयथुः पूतिदंशत्वं रक्तस्रावो विषानिलः ।
इति षोडश निर्दिष्टा विषार्तानामुपद्रवाः ॥
(अ.स.उ. 47/2)

- Jwara (fever)

- Kasa (cough)
- Vami (vomiting)
- Shwasa (dyspnoea)
- Hikka (hiccup)
- Trishna (thirst)
- Murccha (fainting)
- Atisara (diarrhoea)
- Vibandha (very hard faeces)
- Anaha (flatulence)
- Bastishula (pain in the bladder)
- Shirashula (pain in head)
- Shyavathu (swelling)
- Putidamsha (bad smell)

- Raktatrava (bleeding disorder)
- Vishavata (aggravation of Vata from poison).

Visha Upadrava Chikitsa

- **Jwara (fever)**- Decoction of fruit of Rajavrksa, Usira, Kasmarya, Ghana and Padmaka added with sugar and honey.
- **Kasa (cough)**- Katuka together with Sitopala consumed with rice washed water cures fever, Ajaji, Jivaka Rusabhaka, Utpala, Kolamajja, Sita, Bharangi, Yastyahava and Kesara consumed with rice washed water.
- **Vami (vomiting)**- Decoction of root of Bilva added with powder of Marica, or powder of root of Bilva, Dhatri, Parusaka and Madhuka should be consumed along with milk for cure of vomiting.
- **Shwasa (dyspnoea)**- Vaidehi, Ramathaka, juice of Kapittha, Saindava added with sugar and honey licked cures dyspnoea, cough and fever. Draksa, Nagara and Krsna with Vara and Ghana added with ghee and honey cures cough arising from poison; similarly so with Patha, Anjana, Manjista, the two Nisa and Maduka consumed with decoction of Yastyahva.
- **Hikka (hiccup)**- Powder of Shankha, Kanaka, Katuka and Svarnagairika
- **Trishna (thirst)**- The thirst and fainting the entire body including the head is covered with the paste of or poured with water (Ambhojanala), Kusuma, Candana, Usira, Mauktika, Vaihayasasita Toya milk ghee and sugarcane juice made cool. It is best to drink Laja Tarpana added with sugar, Dadima juice, honey and water or drinking water prepared from Vata, Vetasa Jambu, Amra and Sevyamade cold.
- **Murccha (fainting)**- The thirst and fainting the entire body including the head is covered with the paste of or poured with water (Ambhojanala) Kusuma, Candana, Usira, Mauktika, Vaihayasasita toya, milk ghee and sugarcane juice made cool.
- **Atisara (diarrhoea)**- Equal quantity of Bhunimbha, Musta, Trayanti and Indrayava together making one part, two part of Chitraka and eight part of Kutaja, should be powdered nicely and consumed with water, this cures diarrhoea, cough, dyspnoea and fever arising from poison. Fine powder of Lodhra, Mocarasa, Ambastha and Dhataki consumed with rice washed water. Nagara with curds also cures diarrhoea.
- **Vibandha (very hard faeces)**- Triphala with warm water internally
- **Anaha (flatulence)**- Decoction of Triphala, Aragvadha, Vyaghri cures fever and constipation, decoction of unripe bilwa fruit, Musta and Punarnava internal use.
- **Bastishula (pain in the bladder)**- If there is pain in the bladder, upward movement and flatulence, Phalavarti should be introduced. Aragvadha, Trivrut, Upakulya, Haritaki should be consumed with ghee can also be consumed.
- **Shirashula (pain in head)**- Kakoli, bark of Ksiravrksa, Draksa, yastayahva and Sarkara made into nasal drops with cold water cures headache caused by poisoning.
- **Shyavathu (swelling)**- It is beneficial to drink milk boiled, with Visvabhesaja, Vaidehi, Kustuka and Devadaru or goat milk boiled with root of Surasa or Pippali. Trivrut soaked with decoction of Triphala thrice and consumed with ghee cures swelling. Paste of honey, Vella, Vara, Vyosa, Surahava, Usira and Padamaka applied on the effected skin. Fumigation with flowers of Sirisa, Ahisira (snakes head), Nata and Kustha added with ghee.
- **Putidamsha (bad smell)**- The wound of bite emits bad smell even by slight mistakes, poison does not tolerate medicine which possesses penetrating and hot potency qualities, in the treatment wound drugs which possess sweet taste, unctuous, and cold

properties made use of liquid for pouring on the body and paste for application should be done with the decoction of Ksirivrksha added with milk. Paste of leaf buds of Nyagrodha, Madhuka, Tila, Sarsapa, Saindhava, Abhaya and leaves of Nimba with ghee.

- **Raktastrava (bleeding disorder)**- When there is copious bleeding (from the wound) the patient should be made to drink ghee processed with Marica or root of Tanduliyaka or sugar. Wound should be coated with a nice paste of Darvi, nasal drops should be done with Sitopala honey, ghee, and goats milk. Paste of Sami should be drunk the body smeared with nice paste of Visala for nasal drops, Hema, Sukla may be used by these the bleeding subsides.

- **Vishavata (aggravation of Vata from poison)**- Oleation enema, nasal medication, insufflations and collyrium are desirable. Medicated ghee prepared with Nagadanti, Abhaya, Kustha, Pippali, Vrusha, Katphala, seeds of Bhallataka, Katuka, Bilva, Prativisa Agnika added with milk cures diseases of Vata caused by poison or drink Eranda Taila mixed with juice of goats meat; a mixture of ghee and oil mixed with soup of meet which are intellect promoting. Persons who are suffering from insanity or epilepsy caused by poison should be made to drink the paste of root of Karpasa, Marica, Haridra, Dharuharidra, Nalada, Nala, Pippali, Savrjika and Kustha mixed with water. Medicated ghee prepared with Vaca, Hamsapadi, Vyosa, Dadhittha, Hastipippali, Devadaru, Bala, Bilva, Krmijit, Kustha, Tuntuka, Lodhra, Akhukarni and Ativisa added with milk. This ghee used for drinking and anointing cures all disease of Vata due to poison.

Drug-induced toxicity

Toxicity refers to how poisonous or harmful a substance can be. In pharmacology, drug toxicity

occurs when a person has accumulated too much of a prescription drug in their bloodstream, leading to negative effects.

Drug toxicity is formally defined as "a diverse array of adverse effects which are brought about through drug use at either therapeutic or non-therapeutic doses."

Drug Toxicity vs. Drug Overdose

Drug toxicity and drug overdose are often confused. One difference is that drug toxicity generally occurs over time, while drug overdose happens when too much of a substance is consumed at once. Drug toxicity is typically accidental, while drug overdose can be either accidental or intentional.

Causes

1. As a result of the over-ingestion of medication - prescribed dosage is too high.
2. Due to an adverse drug reaction: not dependent on dose
3. Other factors: including age, kidney function, and hydration can affect

Three factors determine the toxicity of a toxin or prescription drug. They are:

- Chemical structure
- How much the body can absorb
- The body's ability to detoxify and eliminate the substance

Symptoms

(a) Acute

- Diarrhea
- Nausea
- Vomiting
- Dizziness
- Stomach pains
- Weakness

(b) Severe symptoms

- Ataxia (poor muscle control, resulting in clumsy movements)
- Coma
- Hand tremors
- Heart problems (in rare cases)
- Muscle twitches

- Nystagmus (involuntary jerking of the eyeball)
- Seizures
- Slurred speech

Treatment

1. There are several ways drug toxicity may be treated. If the toxicity results from an acute overdose, a person may undergo stomach pumping to remove drugs that have not yet been absorbed.
2. Activated charcoal is another drug toxicity treatment. It can be used to bind the drug, preventing it from being absorbed into the blood.
3. Other medications may also be given as an antidote for drug toxicity.

Occupational hazards

A hazard is defined as a situation that poses a potential threat or risk to life, health, property, or the environment.



Any illness associated with a specific occupation or industry is referred to as an occupational disease. Such diseases are caused by a variety of biological, chemical, physical, and psychological factors that exist in the workplace or are encountered in the course of employment.

Occupational diseases are largely preventable and can be traced back to poor working conditions. Controlling occupational health hazards reduces the occurrence of work-related diseases and

accidents while also improving worker health and morale, resulting in lower absenteeism and increased worker efficiency. In most cases, the moral and financial benefits far outweigh the costs of removing occupational hazards.

Occupational hazards are risks associated with working in specific occupations. The Occupational Safety and Health Administration (OSHA) describes five categories of occupational hazards: physical safety hazards, chemical hazards, biological hazards, physical hazards, and ergonomic risk factors.

Type

According to their nature, occupational health hazards are classified into five categories:

- 1) **Physical risks** associated with noise, ionising radiation, and temperature.
- 2) **Chemical hazards** from exposure to gases, vapours, fumes, and chemicals
- 3) **Biological hazards**, such as exposure to viruses, bacteria, blood, and blood products
- 4) **Ergonomic risks** are those associated with the need for incorrect posture, monotony, repetitiveness, work shifts, and stressful situations.
- 5) **Accident risks**, such as an unsuitable work environment, insufficient lighting, and potential electrical and fire accidents

Prevention of Occupational hazards

1. **Primary prevention:** is the most effective because it focuses on preventing disease or injury at the source, before it occurs.
2. **Secondary prevention:** aims to raise awareness and detect symptoms early in order to reduce the impact (and spread) of a disease or injury via education, hazard communication, and screening programmes.
3. **Tertiary prevention:** focuses on minimising the harm and impact of an illness or injury by facilitating treatment, ensuring income security, organising housing, and assisting in the return to work, while increasing local and societal recognition (and eventually exposure

control) through compensation documentation and associated costs.

Examples of Occupational Health Hazards

1. Mechanical Hazards

- Falls, cuts, abrasions, concussions, and contusions are all examples of injuries.
- Ergonomics is the science of adjusting man and machine.
- Ergonomic tools – Tools that reduce the stresses or problems that cause CTDs/ MSDs.

2. Psychosocial Hazards

- Lack of job satisfaction, insecurity, poor interpersonal relations, work pressure, and ambiguity are all examples of psychosocial hazards.
- Hostility, aggression, anxiety, depression, alcoholism, drug addiction, sickness absenteeism are all examples of psychological and behavioural changes.
- Psychosomatic disorders such as hypertension, headaches, body aches, peptic ulcers, asthma, diabetes, and heart problems are examples of psychosomatic disorders.

3. **Heat Illness** : Excessive physical activity, extreme ageing, poor physical condition, fatigue, and excessive clothing Dehydration.

Allergic manifestation

Allergies occur when immune system reacts to a foreign substance — such as pollen, bee venom or pet dander — or a food that does not cause a reaction in most people.

The severity of allergies varies from person to person and can range from minor irritation to anaphylaxis — a potentially life-threatening emergency. While most allergies can not be cured, treatments can help relieve allergy symptoms.

Symptoms

Allergic reactions can range from mild to severe. In some severe cases, allergies can trigger a life-threatening reaction known as anaphylaxis.

Hay fever, also called allergic rhinitis, can cause:

- Sneezing
- Itching of the nose, eyes or roof of the mouth
- Runny, stuffy nose
- Watery, red or swollen eyes (conjunctivitis)

A food allergy can cause:

- Tingling in the mouth
- Swelling of the lips, tongue, face or throat
- Hives
- Anaphylaxis

An insect sting allergy can cause:

- A large area of swelling (edema) at the sting site
- Itching or hives all over the body
- Cough, chest tightness, wheezing or shortness of breath
- Anaphylaxis

A drug allergy can cause:

- Hives
- Rash
- Wheezing
- Itchy skin
- Facial swelling
- Anaphylaxis

Atopic dermatitis, an allergic skin condition also called eczema, can cause skin to :

- Itch
- Redden
- Flake or peel

Anaphylaxis

A life-threatening medical emergency, anaphylaxis can cause to go into shock. Signs and symptoms of anaphylaxis include:

- Loss of consciousness
- A drop in blood pressure
- Severe shortness of breath
- Skin rash
- Lightheadedness
- A rapid, weak pulse
- Nausea and vomiting

Endocrine Disruptores

Introduction

Endocrine-disrupting chemicals (EDCs) are

natural or human-made chemicals that may mimic, block, or interfere with the body's hormones, which are part of the endocrine system. These chemicals are associated with a wide array of health issues.

Endocrine disruptors are found in many everyday products, including some cosmetics, food and beverage packaging, toys, carpet, and pesticides.

Some chemicals that act as flame retardants may also be endocrine disruptors. Contact with these chemicals may occur through air, diet, skin, and water.

Example: Atrazine, Bisphenol A (BPA), Dioxins, Perchlorate, Per- and polyfluoroalkyl substances (PFAS), Phthalates (used in nail polish, hair spray, aftershave lotion, cleanser, and shampoo), Polybrominated diphenyl ethers (used in furniture foam and carpet), Polychlorinated biphenyls (used to make electrical equipment, such as transformers, and are in hydraulic fluids, heat transfer fluids, lubricants, and plasticizers).

Links between endocrine-disrupting chemicals and the ways in which wellbeing may be harmed:

1. Attention : Attention-deficit/hyperactivity disorder (ADHD)
2. Immunity : Children exposed to high levels of PFAS had a diminished immune response to vaccines.
3. Metabolism : Long-term exposure to arsenic can disrupt metabolism, increasing the risk of diabetes and other metabolic disorders.
4. Puberty : Chemicals in lavender oil and tea tree oil are potential endocrine disruptors. Researchers found that persistent exposure to lavender oil products is associated with premature breast development in girls, and abnormal breast development in boys.
5. Reproduction : DES can cause epigenetic changes, altering the way genes are turned on and off, in reproductive organs of mice. The findings provide a possible explanation for how endocrine disruptors affect fertility and reproduction.

Occupational hazards

- An industrial worker is exposed to the following five types of hazards (Physical, chemical, biological, mechanical and psychosocial hazards), depending upon the nature of the occupation.

Physical Hazards

- **Heat:** The effects are heat syncope, heat cramps, heat exhaustion, heat stroke, heat hyperpyrexia, prickly heat, burns etc.
- **Cold:** Frost bite, Reynaud's disease, erythromelalgia, erythrocyanosis, chilblains, trench-foot, gangrene etc.
- **Heat syncope-** It is fainting attack due to pooling of blood in lower limbs.
- **Heat cramps-** It is painful and spasmodic contractions of muscles due to loss of sodium and chloride.
- **Heat exhaustion-** It means loss of salt leading on to circulatory failure.
- **Heat hyperpyrexia-** It is characterized by failure in heat regulating mechanism without the features of heat stroke. Temperature is about 106 °F. It may proceed to heat stroke.
- **Heat stroke-** There will be failure in the heat regulating mechanism, resulting in high temperature of the body, delirium, convulsions, partial or total loss of consciousness.
- **Frost bite-** Erythema and slight pain are features. In severe case painless, paraesthetic parts, result in deep seated destruction, gangrene and blistering may occur.
- **Erythrocyanosis-** Limbs are swollen and red due to direct exposure to cold.
- **Chilblains-** Erythema, itching, burning especially of dorsa of fingers, toes, heels, nose, ears on exposure to extreme cold. Lesions can be single or multiple and can become blistered and ulcerated.
- **Light-** Effects occur either due to inadequate light or excessive light.

- **Inadequate light**- Headache, eye strain, eye fatigue, eye pain.
- **Excessive light**- Bright light results in glaring, visual fatigue, blurring of vision, discomfort and accidents.
- **Noise**- Noise is a health hazard in many industries. The effects of noise are of two types. **Auditory effects**- Deafness (temporary or permanent), tinnitus (buzzing in the ears). **Non-Auditory effects**- Fatigue, irritability, nervousness, interference with speech and communication, hypertension, peptic ulcer, higher environmental stress.
- **Vibration**- Frequency range 10-500Hz, when working with tools like drill, hammers etc. vibration generally affects hands and arms. After months and years of exposure, fine blood vessels of fingers may become increasingly sensitive to spasm, injuries to joints of fingers, hands, elbows and shoulders may occur.

Exposure to Ultra-violet radiation- On the skin- Darkening of the skin, thickening of the skin, erythema, cancer of the skin. On the eyes (E.g.- Welding)- Photophobia, conjunctivitis, keratitis, corneal ulcer, blindness (Welder's fish), snow blindness.

Exposure to Ionizing radiation- X-rays, radioactive isotopes like cobalt 60, phosphorus 32 produce genetic changes, malformations, cancer, leukemia, ulceration, sterility and death in extreme cases.

Chemical Hazards

Chemical agents act in 3 ways: Local, Inhalation and Ingestion. The ill effects depend on duration of exposure, amount and individual susceptibility.

1. **Local effects**: Dermatitis, eczema, ulcer and even cancer.
 - a. Dermatitis due to allergy- machine oils, rubber, X-ray, Caustic alkalies, lime etc.
 - b. Aromatic nitro and amino-compounds such

as TNT and aniline are absorbed through skin and cause systemic effects.

2. **Inhalation**: Dusts, fumes, gases and metals and their compound.

- **Dusts**- Dusts are finely divided solid particles with size ranging from 0.1 to 150 microns. They are released into the atmosphere during crushing, grinding, abrading, loading and unloading operations. Dusts are produced in a number of industries mines, foundry, quarry, pottery, textile, wood or stone working industries. Example- Pneumoconiosis.
- **Fumes**- Metal fume fever (This chemical intoxication results from inhalation of fumes of molten metals like arsenic, antimony, beryllium, cadmium, cobalt, lead, zinc, mercury etc.)

• **Gases**- Exposure to gases is a common hazard in industries.

- Simple gases- O₂, H₂
- Asphyxiating gases- CO, SO₂, Cl₂, H₂S, methyl isocyanides gas etc.
- Anaesthetic gases- Chloroform, ether, trichloroethylene

Ingestion: Toxic hazards occurring from the metals like lead, arsenic, mercury, cadmium, manganese, chromium etc.

Biological Hazards

Workers may be exposed to infective and parasitic agents at the place of work. These are from the animals and soil. These are common in agricultural industry.

- From the animals- they are called 'Zoonotic diseases'. Ex: Anthrax, rabies, plague, salmonellosis, bovine tuberculosis.
- From the soil- Tetanus, gas-gangrene, malignant oedema, anthrax, mycetoma.

Mechanical Hazards- 10% of accidents in the industry are due to mechanical causes.

Psychological Hazards- These are due to failure of the worker to develop a healthy relationship with his co-workers, employers,

management, supervisors etc. They are divided into two groups.

- Psychological and behavioural changes: Such as hostility, aggressiveness, anxiety, depression, frustration, tardiness, alcoholism, drug addiction, sickness absenteeism etc.
- Psychosomatic ill health: Such as neurosis, fatigue, propensity to peptic ulcer, hypertension, asthma etc.

Occupational Diseases and their Prevention and Control

1. Diseases due to physical agents:

- Heat- Heat hyperpyrexia, heat exhaustion, heat syncope, heat cramps, burns and local effects such as prickly heat.
- Cold- Trench foot, frost bite, chilblains.
- Light- Occupational cataract, miner's nystagmus.
- Pressure- Caisson disease, air embolism, blast (explosion).
- Noise- Occupational deafness.
- Radiation- Cancer, leukemia, aplastic anemia, pancytopenia.
- Mechanical factors- Injuries, accidents.
- Electricity- Burns.

2. Diseases due to chemical agents

- Gases- CO₂, CO, HCN, CS₂, NH₃, N₂, H₂S, HCl, SO₂ these cause gas poisoning.
- Dusts (Pneumoconiosis)

I. Inorganic dusts

- Coal dust- Anthracosis
- Silica- Silicosis
- Asbestos- Asbestosis, cancer lung
- Iron- Siderosis

II. Organic (Vegetable) dusts

- Cane fiber- Bagassosis
- Cotton dust- Byssinosis
- Tobacco- Tobacosis
- Hay or grain dust- Farmer's lung

III. Metals and their compounds- Toxic

hazards from lead, mercury, cadmium, manganese, beryllium, arsenic, chromium etc.

IV. Chemicals- Acids, alkalis, pesticides

V. Solvents- Carbon bisulphide, benzene, trichloroethylene, chloroform etc.

3. Diseases due to biological agents

Brucellosis, leptospirosis, anthrax, actinomycosis, hydatidosis, psittacosis, tetanus, encephalitis, fungal infections etc.

4. Occupational cancers

Cancer of skin, lungs, bladder.

5. Occupational dermatitis

Dermatitis, eczema.

6. Diseases of psychological origin

Industrial neurosis, hypertension, peptic ulcer etc.

Occupational Dermatitis

Occupational dermatitis is a big health problem in many industries. The causes may be :

1. Physical- Heat, cold, moisture, friction, pressure, X-rays and other rays.
2. Chemical- acids, alkalies, dyes, solvents, grease, tar, pitch, chlorinated phenols.
3. Biological- living agents, such as viruses, bacteria, fungi, and other parasites.
4. Plant products- Leaves, vegetables, fruits, flower, vegetables, dust.

Dermatitis producing agents are further classified into :

1. Primary irritants- Primary irritants (e.g. Acids, alkalies, dyes, solvents) cause dermatitis in workers exposed in sufficient concentration for a long enough period of time.
2. Sensitizing substance- On the other hand, allergic dermatitis occurs only in small percentage of cases due to sensitization of the skin.

Prevention: Occupational dermatitis is largely preventable if proper control measures are adopted.

Pre-selection- The workers should be medically examined before employment, and those with an established (or) suspected dermatitis.

Protection- The worker should be given adequate protection against direct contact by protective clothing, long leather gloves, aprons, and boots. The protective clothing should be frequently washed and kept in good order.

Personal Hygiene- There should be available a plentiful supply of warm water, soap and towels the worker should be encouraged and educated to make frequent use of these facilities.

Pneumoconiosis

Dust within the size range of 0.5 to 3 micron, is a health hazard producing, after a variable period of exposure, a lung disease known as pneumoconiosis, which may gradually cripple a man by reducing his working capacity due to lung fibrosis and other complications. The hazardous effects of dusts on the lungs depend upon a number of factors such as (a) chemical composition (b) fineness (c) concentration of dust in the air (d) period of exposure and (e) health status of the person exposed.

Silicosis

Silicosis, also known as Potter's rot is a form of occupational lung disease caused by inhalation of crystalline silica dust and is marked by inflammation and scarring in forms of nodular lesions in the upper lobes of the lungs. It is a type of pneumoconiosis, from pneumo (lung) and konis (dust).

Causes: Because of the wide presence of crystalline silica in nature in an undisturbed form, as in rocks and the earth's crust, people in occupations that disturb the natural state or those involved in collecting or refining the material are at risk of developing silicosis.

These occupations include the following: mining, quarrying, drilling, crushing stones, chipping, grinding, sand blasting, grinding or polishing, in pottery and foundry work, cement manufacturing, glass manufacturing, masonry, blast furnaces, coal mining, construction, cutting or manufacturing heat resistant bricks, dental laboratory technicians.

Signs and Symptoms

- Dyspnoea exacerbated by exertion
- Cough, often persistent and sometime severe
- Fatigue
- Tachypnea
- Loss of appetite and weight loss
- Chest
- Fever
- Gradual dark shallow rifts in nails eventually leading to crack as protein fibre within nails beds are destroyed.

In advance cases

- Cyanosis
- Cor pulmonale
- Respiratory insufficiency.

Diagnosis

- History collection
- Physical examination
- Chest X-ray reveals findings consistent with silicosis
- Pulmonary function testing: may reveal airflow limitation, restrictive defects, reduced diffusion capacity, mixed defects or may be normal (in uncomplicated).

Treatment

Silicosis is an irreversible condition with no cure. Treatment options currently focus on alleviating the symptoms and preventing complications. These include:

- Stopping further exposure to silica and other lung irritants, including tobacco.
- Cough suppressants.
- Antibiotics for bacterial lung infection.
- TB prophylaxis for those with positive tuberculosis skin test.
- Chest physiotherapy to help the bronchial drainage of mucus.
- Oxygen administration to treat hypoxemia, if present Bronchodilators to facilitate breathing.

- Lung
- Transplantation.

Prevention and control

- Rigorous dust control measures like wearing mask improving the ventilation of work place.
- Water spray is often used where dust emanates
- Dust can also be controlled by dry air filtering.

Anthracosis (Coal Workers Pneumonconiosis)

Black lung disease, also known as Coal worker's pneumoconiosis, is caused by long exposure to coal dust. It is a condition characterized by the accumulation of carbon in lungs.

Causes: Inhalation of coal dust.

Risk Factors: Smoking

Signs & Symptoms: No early symptoms, Cough, Chest pain, Breathing difficulty, Dyspnoea, Bronchitis, Cyanosis, Progressive lung stiffening, Shortness of breath, Impaired lung functions

Diagnosis

- History collection
- Physical examination
- Chest X-ray
- Pulmonary function tests
- Chest CT Scan
- HRCT - High resolution CT Scan

Treatment

There is no cure for the black lung disease. Treatments are aimed at the symptoms and complicated.

Prevention and control

- Dust control measures like wearing face mask
- Improving the ventilation of the factory
- Improving the machinery to reduce the dust
- Wetting procedures should be carried out so that the dust will not concentrated in air.

Measures of Health Protection in Industrial units

- Proper Nutrition
- Communicable disease control
- Environment sanitation
- Mental health promotion
- Health education
- Protective measures foe women and children
- Family planning

Byssinosis

Byssinosis is a disease of the lungs brought on by breathing in cotton, dust or dusts from other vegetable fibres such as flax, hemp or jute while at work.

Incidence: In United States, more than 35000 textile workers have been disabled by Byssinosis and 183 died between 1979 and 1992. In India, among 35% of textile industry 7 to 8% of workers are affected with Byssinosis.

Causes

- The most common cause is breathing in the dust produced by raw cotton.
- People who work in the textile industry
- Smoking increases the risk for this disease.

Signs and Symptoms

- Chest tightness
- Progressive Dyspnoea
- Chronic Cough
- Tachypnea
- Wheezing
- Symptoms will get worse at the beginning of the work week and then improve while you are away from the work place, or late in the work week.

Diagnosis

- History collection: Occupation and will ask many questions to try to find out whether your symptoms relate to certain exposure or times of exposure.
- Physical examination

- Chest X-ray
- Pulmonary function tests- Shows typical airflow obstruction and a reduction in investigatory capacity, especially if measured at the start and end of the first work shift.

Treatment

- The most important treatment is to remove the source of exposure to the offending agent.
- Medications such as bronchodilators will usually improve symptoms.
- Corticosteroids may be prescribed in more severe cases.
- Stopping smoking is very important for people with this condition.
- Respiratory treatments including Nebulizers and postural drainage for chronic Conditions.
- Home oxygen therapy if low blood oxygen levels are detected.
- Physical exercise programs, breathing exercises and patient education programs are often very helpful for people with a chronic lung disease.

Complications

Chronic lung disease and Emphysema.

Prevention and control

- Controlling dust to prevent the occurrence of disease.
- Using face masks prevent the dust entering the airway.
- Improving ventilation of the factory so that the dust is reduced.
- Reduction of dust levels by improving machinery.
- Stop smoking if you are a textile industry worker.
- Wetting procedures so that the dust will not concentrated in the air.

Bagassosis

Bagassosis is the name given to an occupational disease of the lung caused by inhalation of bagasse

or sugarcane dust. It was first reported in India by Ganguli and Pal in 1955 in a cardboard manufacturing firm near Kolkata. India has a large cane-sugar industry.

Symptoms - Breathlessness, cough, haemoptysis and slight fever. Initially there is acute diffuse bronchiolitis.

Diagnosis- Skiagram may show mottling in lungs or shadow. There is impairment of pulmonary function.

If treated early, there is resolution of the acute inflammatory condition of the lung. If left untreated, there is diffuse fibrosis, emphysema and bronchiectasis.

Prevention and control

- **Dust control** - Measures for the prevention and suppression of dust such as wet process, enclosed apparatus, exhaust ventilation etc., should be used.
- **Personal Protection**- Personal protective equipment (masks or respirators with mechanical filters or with oxygen or air supply) may be necessary.
- **Medical Control**- Initial medical examination and periodical medical check-ups of the workers are indicated.
- **Bagasse Control**- By keeping the moisture content above 20 per cent and spraying the bagasse with 2 per cent propionic acid, a widely used fungicide, bagasse can be rendered safe for manufacturing use.

Asbestosis

Asbestosis is a chronic inflammatory and fibrotic medical condition affecting the parenchymal tissue of the lungs caused by the inhalation and retention of asbestos fibres.

Causes

1. Exposure to asbestos fibers
2. Occupation like mining, manufacturing, handling or removal of asbestos are at risk of developing asbestosis.

3. Smoking increases the risk of developing asbestosis.

Signs and symptoms

- Dyspnoea especially on exertion
- Chest pain
- Cough, crackles present

Possible additional symptoms include

1. Nail abnormalities
2. Clubbing of fingers

Diagnosis

1. History collection about the occupation and will ask many questions to try to find out whether you relate to occupation
2. Physical examination
3. Chest X - ray shows lung changes
4. CT scan of the lungs shows the specific areas affected
5. Gallium lung scan shows the specific areas affected
6. Pulmonary function tests show typical airway obstruction and a reduction in ventilator capacity.

Treatment

1. There is no cure available
2. Stopping further exposure to asbestos is essential
3. To ease symptoms, postural drainage, chest percussion and vibration can help remove secretion from the lungs.
4. Nebulizers to thin secretions
5. Oxygen therapy by mask or by a plastic piece that fit the nostrils
6. Lung transplantation

Complications

Malignant mesothelioma AND Pleural effusion

Prevention and control:

1. In people who are exposed to asbestos, early screening by chest X-ray
2. Dust control measures like wearing mask, wetting procedures, ventilation should be improved in the work place

3. Frequent rest periods
4. Usage of sophisticated machines.

Farmer's lung

Farmer's lung is due to the inhalation of mouldy hay or grain dust in the agricultural field. In grain dust or hay with a moisture content of over 30 percent, bacteria and fungi grow rapidly, causing a rise of temperature to 40 to 50 deg.C. This heat encourages the growth of thermophilic actinomycetes, of which *Micropolyspora faeni* is the main cause of farmer's lung.

Symptoms- The acute illness is characterized by general and respiratory symptoms and physical signs. Repeated attacks cause pulmonary fibrosis and inevitable pulmonary damage and cor pulmonale. It is quite possible that this condition might be widespread in India considering the bulk of the population engaged in agricultural work.

Diagnosis- X-ray chest shows 'fine nodular density'

Prevention and control

- Dust control measures like wearing mask, cover the mouth and nose by cloth.
- Frequent rest periods.

List of Pneumoconiosis

Disease	Exposure source
Silicosis	Silica dust
Anthracosis	Coal dust
Asbestosis	Asbestos dust
Byssinosis	Cotton fibre
Bagassosis	Molasses (sugarcane)
Berylliosis	Beryllium
Farmer's Lung	Mouldy hay
Siderosis	Iron dust
Stannosis	Tin dust
Bird fancier's lung	Avian/ bird droppings
Compost lung	Compost

Lead Poisoning

More industrial workers are exposed to lead than to any other toxic metal.

Mode of Absorption - Lead poisoning may occur in three ways:

- **Inhalation**- Most cases of industrial lead poisoning is due to inhalation of fumes and dust of lead or its compounds.
- **Ingestion**- Poisoning by ingestion is of less common occurrence. Small quantities of lead trapped in the upper respiratory tract may be ingested. Lead may also be ingested in food or drink through contaminated hands.
- **Skin**- Absorption through skin occurs only in respect of the organic compounds of lead, especially tetraethyl lead. Inorganic compounds are not absorbed through the skin.

Clinical Picture- The clinical picture of lead poisoning or plumbism is different in the inorganic and organic lead exposures. The toxic effects of inorganic lead exposure are abdominal colic, obstinate constipation, loss of appetite, blue-line on the gums, stippling of red cells, anaemia, wrist drop and foot drop. The toxic effects of organic lead compounds are mostly on the central nervous system insomnia, headache, mental confusion, delirium, etc.

Diagnosis- History, clinical features, laboratory test (corroprphyrin in urine test, Amino levulinic acid in urine, lead in blood and urine, basophilic stippling of RBC test).

Prevention and control-

- **Substitution** - Where possible lead compounds should be substituted by less toxic materials.
- **Isolation**- All processes which give rise to harmful concentration of lead dust or fumes should be enclosed and segregated.
- **Local exhaust ventilation**- There should be adequate local exhaust ventilation system to remove fumes and dust promptly.
- **Personal protection** - Workers should be protected by approved respirators.
- **Good house-keeping**- Essential where lead

dust is present. Floors, benches, machines should be kept clean by wet sweeping.

- **Working atmosphere**- Lead concentration in the working atmosphere should be kept below 2.0 mg per 10 cu. metres of air, which is usually the permissible limit or threshold value.
- **Periodic examination of workers**- All workers must be given periodical medical examination. Laboratory determination of urinary lead, blood lead, red cell count, haemoglobin estimation and coproporphyrin test of urine should be done periodically.
- **Personal hygiene**- Hand washing before eating is an important measure of personal hygiene.
- **Health Education**- Workers should be educated on the risks involved and personal protection measures.

Occupational cancer

Occupational cancer is a serious problem in Industry. The sites of the body most commonly affected are skin, lungs, bladder, and blood-forming organs.

Skin cancer- Percival Pott was first to draw attention to cancer of scrotum in chimney sweeps in 1775. It was subsequently found that cancer of the scrotum and of the skin in other parts of the body was caused by coal tar, X-rays, certain oils and dyes. Statistics now show that nearly 75 per cent of occupational cancers are skin cancer. Skin cancers are an occupational hazard among gas workers, coke oven workers, tar distillers, oil refiners, dye-stuff makers, road makers and in industries associated with the use of mineral oil, pitch, tar and related compounds.

Lung cancer- Lung cancer is a hazard in gas industry, asbestos industry, nickel and chromium work, arsenic roasting plants and in the mining of radio-active substances (e.g., uranium).

Nickel, chromates, asbestos, coal tar (presumably 3-4 benzpyrene), radio-active substances and cigarette-smoking are proved

carcinogens for the lungs. Arsenic, beryllium and isopropyl oil are suspected carcinogens. More than nineteenthths of lung cancer are attributed to tobacco smoking, air pollution and occupational exposure.

Cancer bladder- It was first noted in man in aniline industry in 1895. In more recent years, it was noted in the rubber industry. It is now known that cancer bladder is caused by aromatic amines, which are metabolized in the body and excreted in the urine. The industries associated with cancer bladder are the dye-stuffs and dyeing industry, rubber, gas and the electric cable industries.

Leukaemia- Exposure to benzol, roentgen rays and radio-active substances give rise to leukaemia. Benzol is a dangerous chemical and is used as a solvent in many industries. Leukaemia may appear long after exposure has ceased.

Personal hygiene is very important in the prevention of occupational cancer.

Prevention of Occupational Hazards

It can be prevented by 3 levels:

Medical, Engineering and legislation

Medical level

- Prior placement examination
- Periodical check ups or examination
- Medical and health-care facilities
- Notification and record maintenance
- Supervision of work environment and protective measures
- Health education and counselling

Engineering level

- Design of building
- Hygienic measures or good house keeping
- General ventilation, exhaust ventilation
- Mechanization to prevent contact with harmful chemicals
- Substitution for manufacture of less harmful substance
- Dust control by water spraying, hydro-blasting etc
- Enclosure by shielding with protective coverage's

- Isolation of some risky operations
- Protective devises like masks, shields, aprons etc to prevent damage
- Environment monitoring, toxic substances should be below maximum permissible limits
- Research- Longitudinal studies should be conducted about the health of the workers.

Legislation and Acts

- Society has an obligation to protect the health of the worker engaged in diverse occupations. It has grown out of the realisation that the worker is more important than the machine which he operates. The worker cannot be permitted to endanger his life and limb in an occupation, while the employer makes a fortune. Factory laws, therefore, have been framed in every country to govern the conditions in industry and to safeguard the health and welfare of the worker.

Allergic manifestations

- Allergies occur when immune system reacts to a foreign substance such as pollen, bee venom or pet dander or a food that does not cause a reaction in most people.
- The severity of allergies varies from person to person and can range from minor irritation to anaphylaxis or a potentially life-threatening emergency. While most allergies cannot be cured, treatments can help relieve allergy symptoms.

Symptoms

- Allergic reactions can range from mild to severe. In some severe cases, allergies
- can trigger a life-threatening reaction known as anaphylaxis.
- **Hay fever**, also called allergic rhinitis, can cause:
 - Sneezing
 - Itching of the nose, eyes or roof of the mouth
 - Runny, stuffy nose
 - Watery, red or swollen eyes (conjunctivitis)

A food allergy can cause

- Tingling in the mouth
- Swelling of the lips, tongue, face or throat
- Hives
- Anaphylaxis

An insect sting allergy can cause

- A large area of swelling (edema) at the sting site
- Itching or hives all over the body
- Cough, chest tightness, wheezing or shortness of breath
- Anaphylaxis

A drug allergy can cause

- Hives
- Itchy skin
- Rash
- Facial swelling
- Wheezing
- Anaphylaxis

Atopic dermatitis, an allergic skin condition also called eczema, can cause skin to :

- Itch
- Redden
- Flake or peel

Anaphylaxis

- A life-threatening medical emergency, anaphylaxis can cause to go into shock.
- Signs and symptoms of anaphylaxis include:
- Loss of consciousness
- A drop in blood pressure
- Severe shortness of breath
- Skin rash
- Light headedness
- A rapid, weak pulse
- Nausea and vomiting
- Endocrine disruptors
- Introduction
- Endocrine-disrupting chemicals (EDCs) are natural or human-made chemicals that may

mimic, block, or interfere with the body's hormones, which are part of the endocrine system. These chemicals are associated with a wide array of health issues.

- Endocrine disruptors are found in many everyday products, including some cosmetics, food and beverage packaging, toys, carpet, and pesticides.
- Some chemicals that act as flame retardants may also be endocrine disruptors. Contact with these chemicals may occur through air, diet, skin, and water.
- **Example:** Atrazine, Bisphenol A (BPA), Dioxins, Perchlorate, Per- and polyfluoroalkyl substances (PFAS), Phthalates (used in nail polish, hair spray, aftershave lotion, cleanser, and shampoo), Polybrominated diphenyl ethers (used in furniture foam and carpet), Polychlorinated biphenyls (used to make electrical equipment, such as transformers, and are in hydraulic fluids, heat transfer fluids, lubricants, and plasticizers).
- Links between endocrine-disrupting chemicals and the ways in which wellbeing may be harmed:
- **Attention :** Attention-deficit/hyperactivity disorder (ADHD)
- **Immunity :** Children exposed to high levels of PFAS had a diminished immune response to vaccines.
- **Metabolism :** Long-term exposure to arsenic can disrupt metabolism, increasing the risk of diabetes and other metabolic disorders.
- **Puberty :** Chemicals in lavender oil and tea tree oil are potential endocrine disruptors. Researchers found that persistent exposure to lavender oil products is associated with premature breast development in girls, and abnormal breast development in boys.
- **Reproduction :** DES can cause epigenetic changes, altering the way genes are turned on and off, in reproductive organs of mice. The findings provide a possible explanation for how endocrine disruptors affect fertility and reproduction.

Syllabus

1. Vishakta Vayu, Jala and Bhumi (air, water and land pollution)
2. Effect of biological, chemical and nuclear warfare.
3. Ecotoxicology & biomagnification.
4. Toxicovigilance.

Learning objectives

1. Define environmental toxicology.
2. Describe the Lakshanas and Chikitsa of Vishakta Bhoomi, Vishakta Jala, and Vishakta Vayu.
3. Define pollution. Describe various pollutants and explain water pollution, soil pollution, air pollution, along with their health hazards.
4. Describe the health effects of biological, chemical and nuclear warfare.
5. Define ecotoxicology & biomagnification.
6. Explain the concept of toxicovigilance

Total - 7 hours (Lecture :02 hour, Non-lecture: 05 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

Vishakta Vayu, Jala and Bhumi (Air, Water and Land pollution)

विष दुष्टि

राज्ञोऽरिदेशे रिपवस्तृणाम्बुमार्गान्नधूमश्चसनान् विषेण ।
संदूषयन्त्येभिरतिप्रदुष्टान् विज्ञाय लिङ्गैरभिशोधयेत्तान् ॥
(सु.क. 3/6)

Kings cause the spread of poison in the kingdom of enemies by poisoning the Truna (grass-fodder), Ambu (water), Marga (roads), Anna (food material), Dhuma (smoke) and Shwasana (air); understanding these by their features the physician should purify them.

विष दूषित जल लक्षण and चिकित्सा

दुष्टं जलं पिच्छिलमुग्रगन्धि फेनान्वितं राजिभिरावृतं च ।
मण्डूकमत्स्यं प्रियते विहङ्गा मत्ताश्च सानूपचरा भ्रमन्ति ॥
मज्जन्ति ये चात्र नराश्च नागास्ते च्छर्दिमोहज्वरदाहशोफान् ।
ऋ(ग)च्छन्ति तेषामवहृत्य दोषान् दुष्टं जलं शोधयितुं यतेतू ॥
(सु.क. 3/7-8)

Poisoned water will be Picchila (slimy),

Uragandha (possesses strong odour) and Phena (froth) and Rajibhiravrutam (has lines on their surface); Manduka (frogs) and Matsya (fish) living in such water die of intoxication; which immerse in this water will develop Chardi (vomiting), Moha (delusion), Jwara (fever), Daha (burning sensation) birds living in Anupa Desha (marshy places) fly around intoxicated; Manushya (men), Ashwa (horse) and Gaja (elephants) sensation and Shopha (swelling). The Doshas which get aggravated in these animals should be eliminated and attempts made to purify the contaminated water.

विष दूषित जल लक्षण

सविषं विरसं तोयं कवोष्णं राजिभिश्चितम् ।
फेनिलं गुरु विच्छिन्नं खगैरनभिनन्दितम् ॥
मृताकुलितमत्स्यं च स्पर्शाद्भुक्षोफकण्डुकत् ।
ओदनः साधितस्तेन भुक्तमात्रं विदद्यते ॥
विदग्धः पच्यते कृच्छ्रात्पको मूर्च्छाज्वरप्रदः ।
दर्शयेत्सर्वतो नीलपीतलोहितकपुर्णम् ॥
(अं.सं. सू. 8/67-68)

The waters of the reservoirs (ponds, lakes, rivers) which has been poisoned, will have Virasa Toya (bad taste), Kavoshna (slight warmth), full of long streaks (lines) and Phena (foam), Guru (heavy -hard to digest) and Vicchinna (broken up-curdled); rejected by the birds and shoals of dead fish floating. It produces Sparsha Ruka (pain), Shopha (swelling) and Kandukruta (irritation on touch). Rice cooked in that water causes Vidagdha (burning sensation) immediately after eating, Pachyate Kruccha (undergoes digestion after a long time), causing Paka (burning sensation), producing Murrcha (fainting) and Jwara (fever) after digestion and appearance of colours like Nila (blue), Pita (yellow), Lohita Karpura (brown or red) all over the body.

विष दूषित जल चिकित्सा

तत्र शिग्वादिमगदं भूमिदोषोदितं पिबेत् ।
अजशृङ्गीं विशालाख्यां विषघ्नीमुत्तमारणीम् ॥
फणिज्जकं प्रतिविषां दग्ध्वा तद्भस्म गालयेत् ।
बहुशो गालितं तच्च पाचयेत्तत्र च क्षिपेत् ॥
कल्कयित्वा प्रतीवापं सरलां रजनीद्वयम् ।
एलामुदीच्यं मञ्जिष्ठां सुनन्दां बाकुचीमपि ॥
पात्यन्ते बिन्दवस्तस्माद्यत्र तन्निर्विषी भवेत् ।
पाटलापारिभद्राश्वकर्णशम्याकशिग्रुकान् ॥
कलशान्तर्गतान् दग्ध्वा प्रक्षिपेत्सविषेऽम्भसि ।
(अं.सं. सू. 8/69)

In such a condition, the Shigrevadi agada described under purification of land, should be given to drink. Ajashringi, Vishala, Vishaghni (Guduchi), Uttamarani (Padmasharini) Phanijjaka and Prativisha are all to be burnt and made into ash. This ash is dissolved in water and filtered many times. It is then boiled adding to it a paste prepared from Sarala, (Trivrut), the two types of Rajani, Ela, Udichya, Manjishtha, Sunanda and Bakuchi (afterwards the water is reduced a little by boiling, it is taken out for use) where ever drops of this water fall those parts become de-poisoned.

Patala, Paribhadra (Nimba), Ashwakarna, Shamyaka and Sidhraka (Sindu- Vara) are all put into a pot, set on fire and the mouth of the pot closed with the lid. The ash, taken out later, is sprinkled

over the poisoned water (of the reservoirs to detoxicate it).

दूषित जल शोधक औषधि

धवाश्वकर्णासनपारिभद्रान् सपाटलान् सिद्धकमोक्षकौ च ।
दग्ध्वा सराजद्रुमसोमवल्कां स्तद्भस्म शीतं वितरेत् सरःसु ॥
भस्माञ्जलिं चापि घटे निधाय विशोधयेदीप्सितमेवमम्भः ।
(सु.क. 3/9-10)

Dhava, Ashvakarna, Asana, Paribhadra, Patala, Siddhaka, Mokshaka, Rajadruma and Somavalka should be burnt and the ash spread on the water of lakes, reservoirs of water and a handful of this ash should be put into the pot containing drinking water to be used when needed.

विषदूषित भूमि लक्षण and चिकित्सा

क्षितिप्रदेशं विषदूषितं तु शिलातलं तीर्थमथेरिणं वा ॥
स्पर्शन्ति गात्रेण तु येन येन गोवाजिनागोष्ट्रखरा नरा वा ।
तच्छूनतां यात्यथ दह्यते च विशीर्यते रोम नखं तथैव ॥
तत्राप्यनन्तां सह सर्वगन्धैः पिष्ट्वा सुराभिर्विनियोज्य मार्गम् ।
सिञ्चेत् पयोभिः सुमृदन्वितैस्तं विडङ्घ्वापाठाकटभीजलैर्वा ॥
(सु.क. 3/10-12)

Ground surfaces of stones (boulders), banks of rivers and sand dunes which have been poisoned and which come in contact with the body parts of cows, oxen, horses, elephant, camel, donkey and men, produces swelling, burning sensation and makes hairs and nails to fall off. Then Ananta (Durva) along with Sarvagandha (fragrant drugs such as Ela, Karpura etc.) and sweets (honey, jaggery etc.) made as paste should be dissolved in sura (beer) or water and sprinkled on the (poisoned) road, or water boiled with Vidanga, Patha and Katabhi be sprinkled.

विषदूषित भूमि लक्षण

विषेणोपहता भूमिः क्वचिद्दग्धेव लक्ष्यते ।
प्रम्लानतृणगुल्मादिमनृतकीटसरीसृपा ॥
विशीर्यन्ते खुरनखा दाहकण्डूरुजान्विताः ।
छर्दिर्मूर्च्छा ज्वरो मोहः शिरोदुःखं च जायते ॥
(अं.सं.सू. 8/64-65)

The region of land which has been poisoned appears as though burnt from fire, the grass and bush will be found faded and drooping down; insects and crawling animals lying dead, the hoofs

and nails (of horse etc.) become cracked and fall off, may develop burning sensation, itching and pain, men and animals may develop vomiting, fainting, fever, delusion and headache.

विषदूषित भूमि चिकित्सा

तत्र शोभाञ्जनान्मूलं सोमवल्लीमुशीरकम् ।
मातुलुङ्गरसं हिङ्गु पाययेद्दधि मात्रया ॥
मूत्राणअयजाविहस्तिभ्यो मांसानि रुधिराणि च ।
सर्वगन्धैः समायोज्य पचेत्पके च निक्षिपेत् ॥
सोमराजीं सुनन्दाख्यां सरलां गन्धनाकुलीम् ।
चारटीं त्रायमाणां च प्रोक्षयेत्तेन तां भुवम् ॥
(अं.सं. सू. 8/66)

In such a condition, the roots of Shobhanjana, Somavalli, Ushira, juice of Matulunga, Hingu are to be made into a drink mixed with little amount administered to all (men and animals). of curds and urine, flesh and blood of goat, sheep and elephants added with all the fragrant drugs are to be boiled well in water and that water sprinkled all over the poisoned land; like-wise, water boiled with Somaraji, Sunanda (Rasna), Sarala (Trivruta), Gandhanakuli, Charami, and TrayamaGa should be sprinkled all over the land.

विषदूषित तृण, अन्न लक्षण and चिकित्सा

तृणेषु भक्तेषु च दूषितेषु सीदन्ति मूर्च्छन्ति वमन्ति चान्ये ।
विड्भेदमृच्छन्त्यथवा म्रियन्ते तेषां चिकित्सां प्रणयेद्यथोक्ताम् ॥
विषापहैर्वाऽप्यगदैर्विलिप्य वाद्यानि चित्राण्यपि वादयेत् ।
तारःसुतारः ससुरेन्द्रगोपः सर्वैश्च तुल्यः कुरुविन्दभागः ॥
पित्तेन युक्तः कपिलान्वयेन वाद्यप्रलेपो विहितः प्रशस्तः ।
वाद्यस्य शब्देन हि यान्ति नाशं विषाणि घोराण्यपि यानि सन्ति ॥
(सु.क. 3/13-15)

If grass (fodder), Bhakta (cattle feed, corns etc.) are poisoned, then the animals become weak, faint, some vomit, some purge and some even die. They should be treated quickly and suitably; fodder etc, should be smeared with antitoxic and anti-poisonous drugs, they (animals) should be made to hear the melodious sound of musical instrument such as drums, kettle drum etc which are beaten hard being smeared with the paste of Tara (silver), Sutara (mercury) Surendra (gold), Gopa (Sariva) and Kuruvinnda (Musta) - all equal in quantity, macerated in the bile of brown coloured cow. By

the sound of the such musical instruments (drums, kettledrum etc) poison though strong becomes destroyed.

विष मिश्रित अन्न लक्षण and चिकित्सा

उपक्षिप्तस्य चात्रस्य वाष्पेणोर्ध्वं प्रसर्पता ॥
हृत्पीडा भ्रान्तनेत्रत्वं शिरोदुःखं च जायते ।
तत्र नस्याञ्जने कुष्ठं लामज्जं नलदं मधु ॥
कुर्याच्छिरीषरजनीचन्दनैश्च प्रलेपनम् ।
हृदि चन्दनलेपस्तु तथा सुखमवाप्नुयात् ॥
(सु.क. 1/34-36)

Poisoned food when put on fire, the fumes raising from it produces pain in the region of the heart, unsteady movement of the eyes and headache; for this, nasal medication (snuffs) and collyrium prepared from Kushtha, Lamajja, Nalada and Madhu (honey) should be administered; body should be anointed with the paste of Shiricha, Rajani and Chandana; applying the paste of Chandana on the region of the heart gives comfort.

हस्त विष स्पर्श लक्षण and चिकित्सा

पाणिप्राप्तं पाणिदाहं नखशातं करोति च ।
अत्र प्रलेपः श्यामेन्द्रगोपासोमोत्पलानि च ॥
(सु.क. 1/37)

When poison is present in the hands, it gives rise to burning sensation of the palm and falling off the nails; for this, the treatment is smearing the hand with paste of Shyama (Priyangu), Indra (Indravavuni) Gopa (Sariva), soma (Guduchi) and Utpala.

आस्य विष लक्षण and चिकित्सा

स चेत् प्रमादान्मोहाद्वा तदन्नमुपसेवते ।
अष्टीलावत्ततो जिह्वा भवत्यरसवेदिनी ॥
तुद्यते दह्यते चापि श्लेष्मा चास्यात् प्रसिच्यते ।
तत्र बाष्पेरितं कर्म यच्च स्याद्दान्तकाष्टिकम् ॥
(सु.क. 1/38-39)

If by mistake or by greed such a poisoned food is eaten, then the tongue becomes hard like the blacksmith's anvil, incapable to recognise tastes; there will be pricking pain, burning sensation and more of Kapha (saliva) flows out. In this condition treatments suggested for (poisoned) fumes and tooth brush should be done.

विष दूषित धूम/वायु लक्षण and चिकित्सा

धूमेऽनिले वा विषसंप्रयुक्ते खगाःश्रमार्ताः प्रपतन्ति भूमौ ।
कासप्रतिश्यायशिरोरुजश्च भवन्ति तीव्रा नयनामयाश्च ॥
(सु.क. 3/16)

If smoke and air are poisoned, birds fall to the ground exhausted, develop Kasa (cough), Pratishyaya (nasal catarrh), Shiroruja (headache) and Tivra Nayana Roga (severe eye diseases).

शीते घर्मो हिमश्रोष्णो मारुतो विषसंयुतः ॥
भ्रममूर्च्छादिकारी च शिग्रवादिस्तत्र चेष्टते ।
(अं.सं. सू. 8/70)

The air that has been poisoned will be cold during summer and hot during winter, causes Bhrama (giddiness), Murccha (fainting) and other symptoms. In this condition the Shigrvadi Agada is to be made use.

चिकित्सा

लाक्षाहरिद्रातिविषाभयाब्दहरेणुकैलादलवक्रकुष्ठम् ।
प्रियङ्गुकां चाप्यनले निधाय धूमानिलौ चापि विशोधयेत् ॥
(सु.क. 3/17)

Laksha, Haridra, Ativisha, Abhaya, Abda (Musta), Harenuka, Eladala (leaf of Ela), Vakra (Tagara), Kustha and Priyangu should be put on fire and the resulting smoke purifies the air.

देवदारुनतानन्तामधुकाञ्जनगैरिकम् ॥
वज्रकन्दं लतां लोधं विकिरेत् श्लक्ष्णचूर्णितम् ।
वृक्षाग्रेषु पताकासु दूष्येषु सुमहत्सु च ॥
सर्वतश्चूर्णसम्पर्कान्निर्विषो जायतेऽनिलः ।
(अं.सं. सू. 8/70)

Fine powder of Devadaru, Nata, Ananta (Durva) Arjuna, Gairika, (red ochre) Vajrakanda (Sudha), Lata (Priyangu) and Lodhra is to be sprinkled over the top of the trees, flag posts, tall pillars, gabels of tall houses, etc. By coming in contact with this powder everywhere, the poisoned becomes detoxicated.

विषदूषित वृक्ष लक्षण and चिकित्सा

विकृता भवति छाया पादपे विषदूषिते ॥
निर्गन्धमतिगन्धं वा तत्पुष्पं हृच्छिरोरुजम् ।
कुर्यात् फलपलाशादि कण्डूपाकातिसारकृत् ॥
भूमीमुद्दिश्य यत्प्रोक्तं तत्सर्वं तत्र शस्यते ।
(अं.सं. सू. 8/71)

The shade of the trees which have been poisoned is found to be abnormal, the flowers of such trees, might either lose their fragrance or become more fragrant than usual, may cause itching, ulcerations and diarrhoea. The treatment for these conditions is all those which were prescribed for purifying the land.

Effect of Biological, Chemical and Nuclear Warfare**Introduction**

- Pollution is the introduction of contaminants into the natural environment that causes adverse change.
- **Major forms of pollution** : Air pollution, light pollution, littering, noise pollution, plastic pollution, soil contamination, radioactive contamination, thermal pollution, visual pollution, water pollution.
- Pollution can take the form of chemical substances or energy, such as noise, heat or light. In 2015, pollution killed 9 million people in the world.

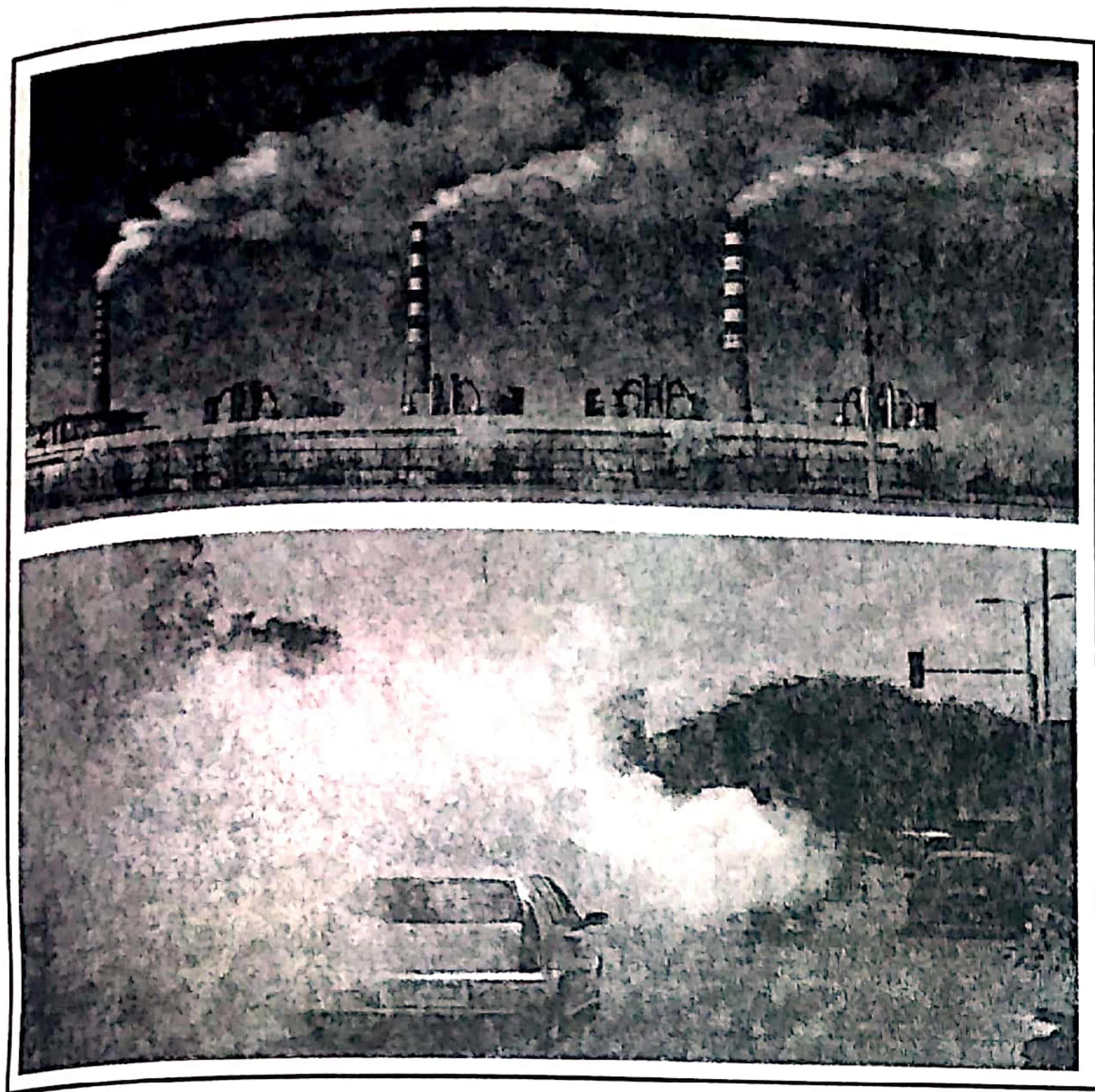
We come into contact with a vast number of chemical, biological, and physical agents that could do us harm. These agents are present in the air we breathe, the water we drink, and even the food we eat. We encounter them when we travel, when we work or when we use consumer goods such as cosmetics or electrical equipment. Determining the source of these risks, and quantifying their effects, requires collaboration by experts across a host of different disciplines.

Toxicology and Environmental Health gives fundamentals informations to assess the risks present in everyday life. Gain the knowledge and skills needed to identify chemical, biological, and physical hazards, as well as the risks associated with exposure to these agents.

Form of pollution

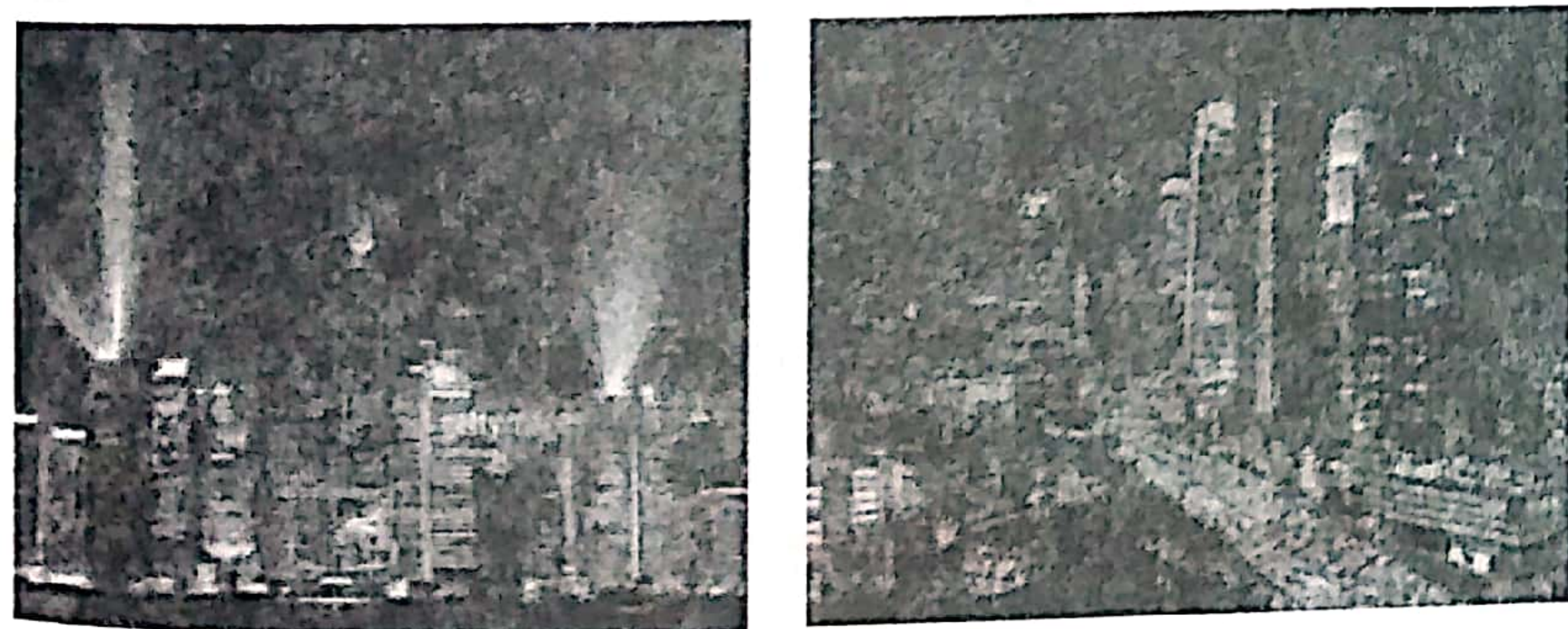
The major forms of pollution are listed below along with the particular contaminant relevant to each of them:

- **Air pollution** : The release of chemicals and particulates into the atmosphere. Common gaseous pollutants include carbon monoxide,



sulfur dioxide, chlorofluorocarbons (CFCs) and nitrogen oxides produced by industry and motor vehicles. Photochemical ozone and smog are created as nitrogen oxides and hydrocarbons react to sunlight. Particulate matter, or fine dust is characterized by their micrometre size PM_{10} to $PM_{2.5}$.

- **Light pollution** : Includes light trespass, over-illumination and astronomical interference.



- **Littering** : The criminal throwing of inappropriate man-made objects, unremoved, onto public and private properties.



- **Noise pollution** : Which encompasses roadway noise, aircraft noise, industrial noise as well as high-intensity sonar. Human Audible frequency range is 20 Hz to 20 KHz



- **Plastic pollution** : Involves the accumulation of plastic products and microplastics in the environment that adversely affects wildlife, wildlife habitat, or humans.



- **Soil contamination** : Occurs when chemicals are released by spill or underground leakage. The most significant soil contaminants are hydrocarbons, heavy metals, methyl tertiary-butyl ether (MTBE), herbicides, pesticides and chlorinated hydrocarbons.



- **Radioactive contamination** : Resulting from

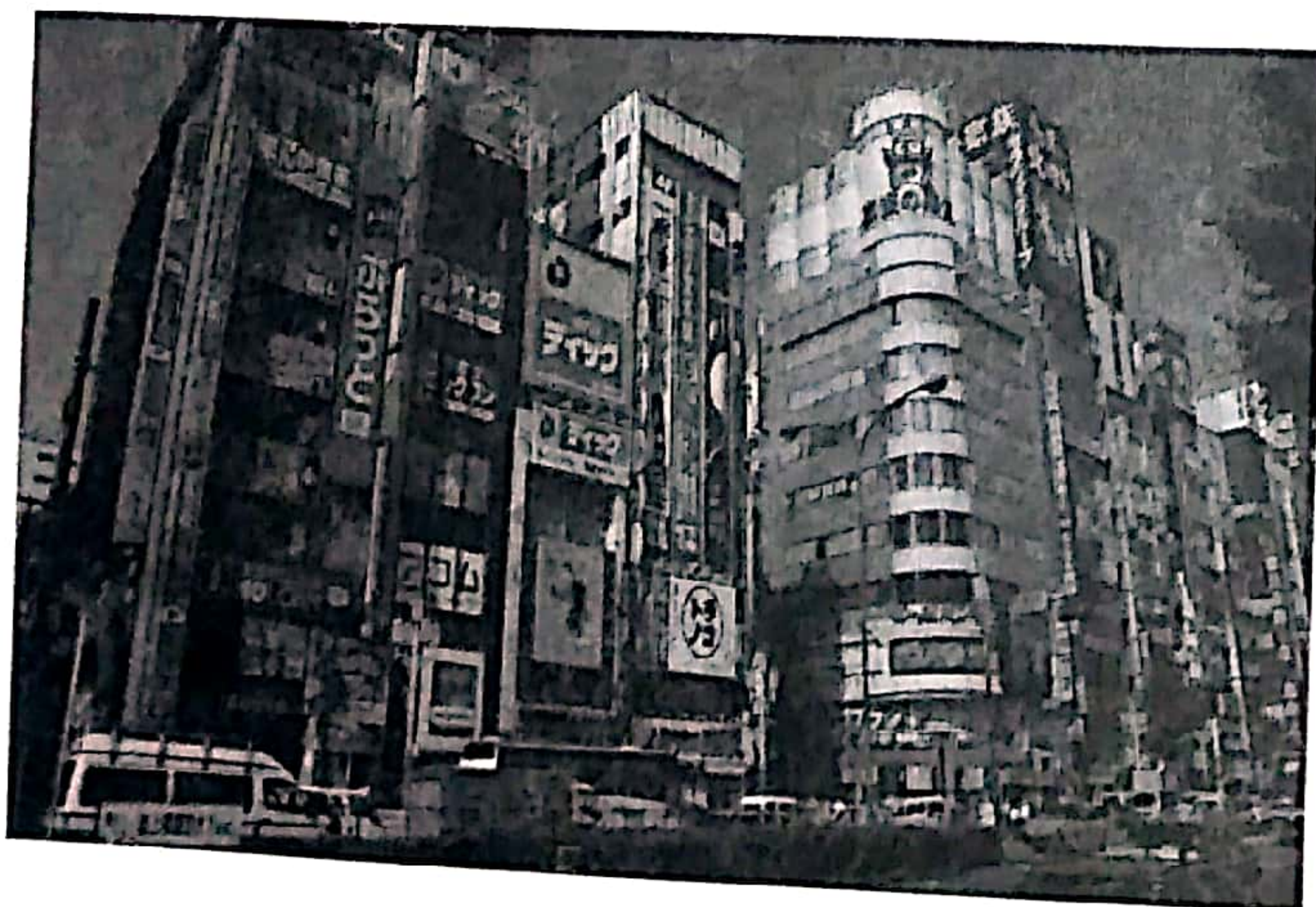
20th century activities in atomic physics, such as nuclear power generation and nuclear weapons research, manufacture and deployment.



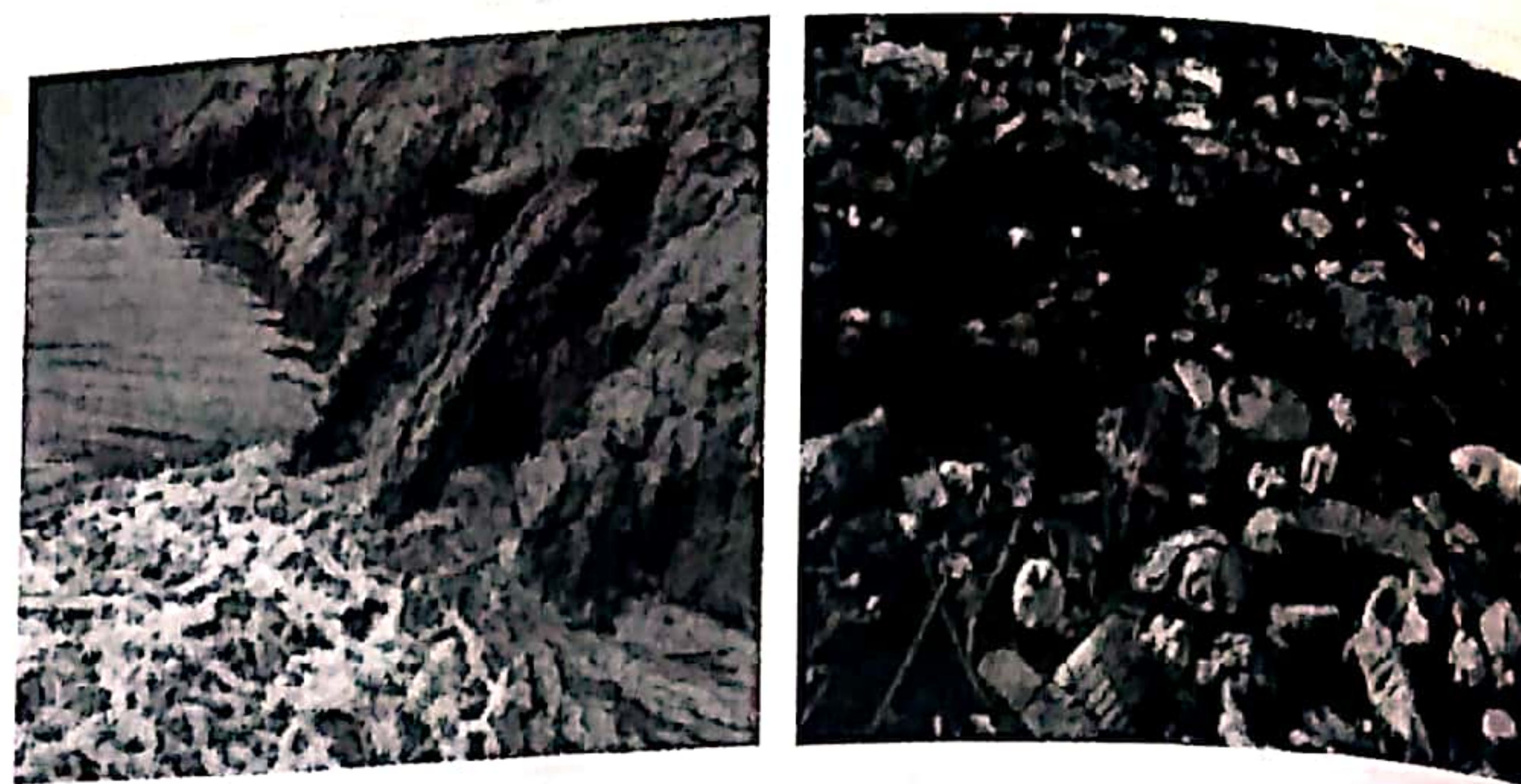
- **Thermal pollution** : Thermal pollution is a temperature change in natural water bodies caused by human influence, such as use of water as coolant in a power plant.



- **Visual pollution** : Which can refer to the presence of overhead power lines, motorway billboards, scarred landforms (as from strip mining), open storage of trash, municipal solid waste or space debris.



- **Water pollution** : By the discharge of wastewater from commercial and industrial

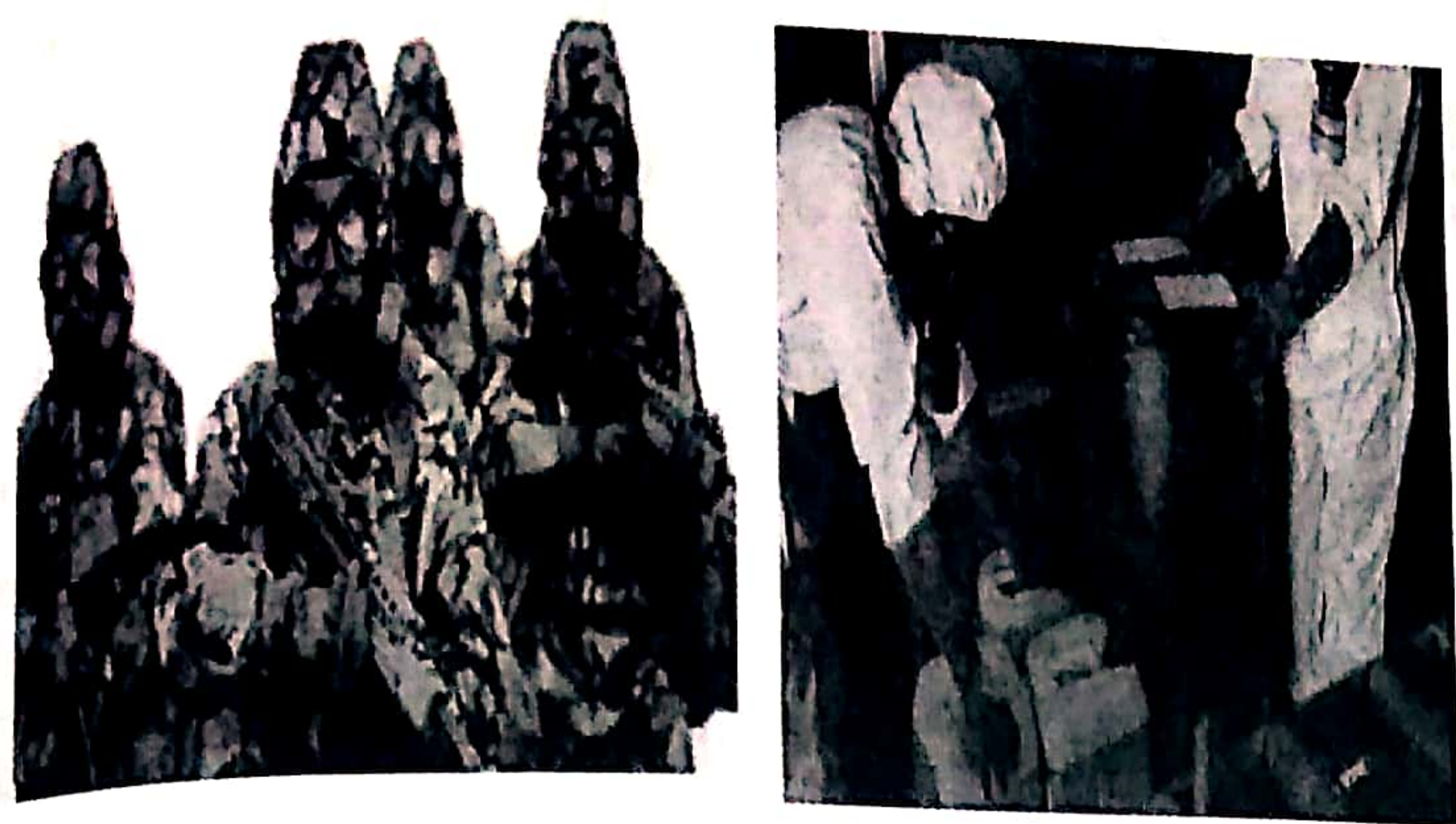


waste (intentionally or through spills) into surface waters; discharges of untreated domestic sewage, and chemical contaminants, such as chlorine, from treated sewage; release of waste and contaminants into surface runoff flowing to surface waters (including urban runoff and agricultural runoff, which may contain chemical fertilizers and pesticides; also including human feces from open defecation - still a major problem in many developing countries); groundwater pollution from waste disposal and leaching into the ground, including from pit latrines and septic tanks; eutrophication and littering.

Effect on human health

- **Air pollution** : Respiratory disease, cardiovascular disease, throat inflammation, chest pain, and congestion. Older people are majorly exposed to diseases induced by air pollution. Those with heart or lung disorders are at additional risk. Children and infants are also at serious risk. The WHO estimated in 2007 that air pollution causes half a million deaths per year in India.
- **Water pollution**: Approximately 14,000 deaths per day occurs mostly due to contamination of drinking water by untreated sewage in developing countries. Oil spills can cause skin irritations and rashes.
- **Noise pollution** • It induces hearing loss, high blood pressure, stress, and sleep disturbance.
- Mercury has been linked to developmental deficits in children and neurologic symptoms. Lead and other heavy metals have been shown to cause neurological problems. Chemical and radioactive substances can cause cancer and as well as birth defects.

Chemical warfare



- The use of toxic chemical agents as a weapon of war or terror to kill or injure an enemy in war. Chemical warfare involves using the toxic properties of chemical substances as weapons for mass destruction.
- **Source:** Industrial accidents, military operations, war, or a terrorist attack. Industrial accidents are a significant potential source of exposure to chemical agents. eg. : phosgene, cyanide, anhydrous ammonia, and chlorine. These chemicals are frequently transported by industry.
- Mustard gas used in World War I and today Sarin (lethal neurotoxin) is potentially available chemicals, which could be considered as a weapon of mass destruction, and their use is condemned by most civilized nations.

History

- The accidental release of a methylisocyanate cloud (composed of phosgene and isocyanate) was implicated in the Bhopal, disaster in 1984 (Bhopal gas tragedy).
- Chemical weapons first were used in 1915, when the German military released 168 tons of chlorine gas at Ypres, Belgium, killing an estimated 5,000 Allied troops. Two years later, the same battlefields saw the first deployment of sulfur mustard. Sulfur mustard was the major cause of chemical casualties in World War I.

- Civilians also have been exposed inadvertently to chemical weapons many years after weapon deployment during war. Some 50,000 tons of mustard shells were disposed of in the Baltic Sea following World War I. Since then, numerous fishermen have been burned accidentally while hauling leaking shells aboard boats. Leaking mustard shells also have injured collectors of military memorabilia and children playing on old battlefields.

Most dangerous chemical weapons

5 most deadly chemical weapons on Planet Earth are VX, Sarin, Mustard Gas, Tabun and Lewisite.

- Most dangerous: Phosgene is considered one of the most dangerous existing chemical weapons.
- Most attainable: Chlorine.
- Special chemical weapon: Riot control agents (temporarily make people unable to function by causing irritation to eye, mouth and skin etc.).

Types of Chemical Weapon Agents

1. Nerve agents : sarin, soman, cyclohexylsarin, tabun, VX.
2. Vesicating or blistering agents : mustards, lewisite.
3. Choking agents or lung toxicants : chlorine, phosgene, diphosgene.
4. Cyanides.
5. Incapacitating agents : anticholinergic compounds.

Clinical effects

Immediate: Large inhalation exposures to nerve agents or mustards are likely to kill people immediately.

Delayed: Small exposures on the skin to nerve agents and mustards are more dangerous than they seem at first. People exposed to such agents need

to be carefully observed for slowly developing or delayed effects.

Management

1. Personal protective equipment: First responders to a chemical attack are at serious risk themselves from the chemically contaminated environment (known as the hot zone). They can come in direct contact with the CW or inhale the vapour. They are also at risk if they handle skin and clothing of victims if a liquid chemical agent was used. Vapors pose little added risk for anyone outside the hot zone.

2. Decontamination: Decontamination is the physical process of removing the remaining chemicals from people, equipment, and the environment.

Immediate decontamination is a major treatment priority :

- Initial decontamination involves removing all contaminated clothes and jewelry from the affected person and then washing the body thoroughly with warm water and soap.
- Hot water and vigorous scrubbing may actually worsen the effects by increasing chemical absorption into the skin.
- Vapor exposure alone may not require decontamination. But if it is not known whether the exposure was to a vapor or liquid, or if exposed people have symptoms, they should undergo decontamination.

3. Supportive and specific therapy: Doctors will first make sure exposed victims are able to breathe. For many chemical warfare agents, doctors can only treat the symptoms they produce. But specific, well-established antidotes are available for nerve agent and cyanide exposures. Lab tests are not widely available in hospitals to rapidly confirm exposure to chemical agents.

Nuclear warfare

It is warfare in which nuclear weaponry is used to inflict damage on the enemy. Nuclear weapons are weapons of mass destruction. eg. Russia - Ukraine war



Nuclear warfare can produce destruction in a much shorter time and can have a long-lasting radiological warfare result.

The first nuclear weapon was successfully detonated on July 16, 1945. The nuclear weapon, code named "Trinity", yielded an explosion which was equivalent to 20 kilotons of Trinitrotoluene (TNT). This reaction unexpectedly had a shock wave which could be felt 100 miles away. Compared to chemical reactions, the amount of energy that can be released from nuclear reactions can be up to a million times greater.

Effect of nuclear warfare

Apart from the immediate destruction of infrastructure and the loss of millions of lives, the scientists were mostly concerned about the possible aftermath of such a war. The detonation of some hundreds of atomic bombs would cause a nuclear winter, with disastrous impacts on the environment and human food resources.

In a nuclear explosion, the human body can be irradiated by at least three processes. The first and significant, cause of burns is due to thermal radiation and not caused by ionizing radiation. It is likely that one such particle upon the skin would be able to cause a localized beta burn.

Ecotoxicology and Biomagnification

In 1960's the term ecotoxicology was introduced for the study of environmental toxicity caused by both natural and artificial substances on living organisms present in the nature. Environmental toxicology or ecotoxicology specifically deals with the interactions,

transformation, fate and effects of natural and synthetic chemicals in the biosphere (individual organisms, populations, community and whole ecosystems).

Definition

Ecotoxicology is the branch of science dedicated to studying the presence and adverse effects of chemicals in animals and plants, including the processes and factors that determine their transportation, transformation and breakdown in the environment, in order to evaluate the risk that they represent for life and the strategies required to minimize it.

This is an inter- and multidisciplinary field of Environmental Sciences includes Geology, Chemistry, Physiology and Toxicology laboratories.

Introduction

Various chemicals present in our environment are harmful to human as well the other organism present in ecosystem. Nowadays, these chemical substances mixed in the environment are the major cause of global problems.

Natural substances as well as man-made artificial (xenobiotics) compounds are harmful when unusually distributed in the environment and also enter the element cycle of the ecosystem.

Natural process of intoxication

- There are large number of toxic chemicals produced by plants, fungi and animals.
- Various natural activities like soil leaching, volcanic eruptions and anthropogenic inputs

Major Toxic substances, their source and effect

Toxic/hazardous substance	Source	Toxicological effect
Lead	Paint, gasoline	Inhibition of synthesis of haemoglobin, affects central and peripheral nervous system.
Elementary Mercury	Coal combustion	Causes insomnia, depression and irritability
Ozone	Reaction of NO _x and VOC (volatile organic compound) in presence of sunlight.	Irritates eye, upper respiratory system and eyes

are the different sources through which metals are introduced in the aquatic environments, the sea being the final acceptor of these toxic compounds (Ramade, 1992).

It includes:

- Hazardous wastes
- Industrial chemicals,
- Heavy metals
- Pesticides and fertilizers

It affect on:

- The organism
- Population
- Community
- Ecosystem.

Mechanism of action

It is a multidisciplinary and multi step process of harmful chemicals activity. Mechanism includes-

1. Sources,
2. Pathways and
3. Effects of chemicals

Action required

1. To predict how toxic substances are likely to impact ecological system. Various tests are done to chemicals prior to their release into the environment and on existing chemicals for which actual effects are still unknown.
2. To assess various changes occurring in ecological systems under the influence of released substances, so to assess the environmental risks of the chemicals.

Arsenic	Treated lumber	Coagulates protein and forms complexes with co-enzymes, arsenicosis manifest in skin discoloration and other symptoms.
Beryllium	Combustion of coal and fuel oil.	Causes lung fibrosis and pneumonitis
Cadmium	Batteries	Causes painful bone disease and kidney damage
Cyanide	Vehicle exhaust	Rapidly acting poison
Hydrogen fluoride	Aluminum production or phosphate fertilizer plants.	Fluorosis (bone abnormality and mottled soft teeth)
Hydrogen sulphide	Petroleum refineries	Headache, dizziness, affects central nervous system

Toxicovigilance

Toxicovigilance is the active process of identifying and evaluating the toxic risks existing in a community, and evaluating the measures taken to reduce or eliminate them. It involves the analysis of poisons centre enquiries to identify whether there are specific circumstances or agents giving rise to poisoning, or certain populations suffering a higher incidence of poisoning.

Toxicovigilance can also reveal whether there is an emerging toxicological problem resulting from, for example, the reformulation of a product or a change to its packaging or labelling, the availability of a new drug of abuse, or an

environmental contamination. Once a problem has been identified the poisons centre is responsible for alerting the appropriate health and other authorities so that the necessary preventive and regulatory measures may be taken.

Use of toxicovigilance in laboratory

To deal with this problem, the toxicovigilance system intervenes to

1. Identify poisoning cases,
2. Collect, and
3. Analyze data relating to poisoning, process, evaluate, communicate, and alert authorities and the public for preventive actions.

Dermatological Manifestations of Visha (Poisons)

Syllabus

1. Contact dermatitis and its management.
2. Signs and symptoms and management of abhyanga visha, lepa visha, vastra visha, paduka visha, abharana visha etc. with contemporary relevance.
3. Signs and symptoms and management of dermatological manifestations due to cosmetics, chemicals, occupational and other allergens.
4. Dermatological manifestation due to dooshivisha and garavisha.
5. Dermatological manifestation due to bites and stings.

Learning objectives

- Describe the clinical presentations and diagnosis of paduka visha, abharana visha, vastra visha, lepa visha, abhyanga visha, etc.
- Discuss the management of paduka visha, abharana visha, vastra visha, lepa visha, abhyanga visha, etc.
- Describe contact dermatitis and its types.
- Discuss the application of treatment principles of Agada Tantra in the contact dermatitis.
- Discuss the dermatological conditions caused due to Garavisha and dooshivisha. Discuss the application of principles of treatment of Garavisha and dooshivisha in the management of dermatological manifestations. Discuss the diagnosis and application of the treatment principles of Keeta visha in dermatological manifestations due to bites & stings.

Total - 8 hours (Lecture :06 hour, Non-lecture: 02 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

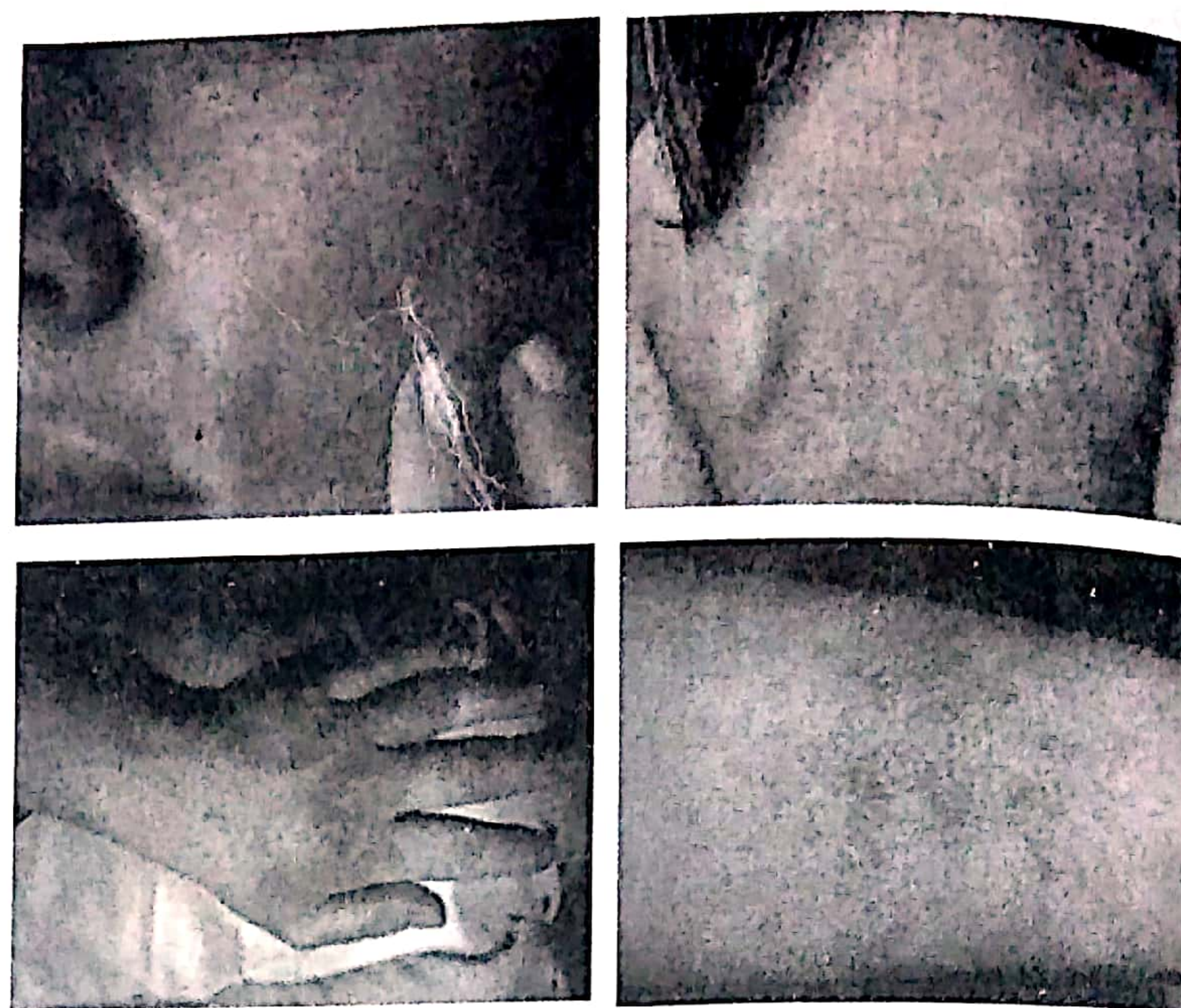
Dermatological manifestations of poisoning can vary widely depending on the specific toxic substance involved, its route of exposure, the duration of exposure, and individual factors. Poisoning can occur through various means, such as ingestion, inhalation, injection, or skin contact. Here are some common dermatological manifestations associated with poisoning:

- **Skin Irritation:** Many toxic substances can cause skin irritation, leading to redness, itching, and inflammation. This can manifest as dermatitis or contact dermatitis and is often seen in cases of exposure to irritant chemicals,

such as certain cleaning agents or industrial chemicals.

- **Rash:** Poisoning may lead to the development of a rash on the skin. The rash can take various forms, including hives (urticaria), red blotches, or raised, itchy bumps. The appearance of the rash depends on the toxic agent and the individual's sensitivity.
- **Blisters:** Exposure to certain chemicals or toxins can cause the formation of blisters on the skin. These blisters may be filled with clear fluid or, in some cases, with blood or pus.

- **Burns:** Strong acids, bases, or other corrosive substances can lead to chemical burns on the skin. These burns can cause significant damage and may require specialized medical treatment.
- **Hyperpigmentation:** Some toxins can lead to changes in skin pigmentation, resulting in darkening or discoloration of the affected area.
- **Hypopigmentation:** In some cases, exposure to certain toxins can lead to a loss of skin pigmentation, resulting in lighter or white patches on the skin.
- **Ulceration:** Severe poisoning can lead to the development of skin ulcers or open sores. These ulcers may be painful and slow to heal.
- **Pruritus (Itching):** Itching of the skin is a common symptom of many poisonings and can be quite distressing for the affected individual.
- **Allergic Reactions:** Some poisons can trigger allergic reactions, such as hives, swelling, or eczema-like skin changes. These reactions are often characterized by redness, itching, and inflammation.
- **Systemic Effects:** Some toxins can cause systemic symptoms, such as fever, malaise, and organ dysfunction. These systemic effects may also affect the skin, leading to a range of dermatological manifestations.



Skin irritation and skin rashes produced by irritating chemical substances are a very noticeable type of chemical toxicity. Skin infections by fungi (ringworm, athlete's foot, etc.), bacteria, or parasites are also very common medical problems and often have the same symptoms as skin irritation caused by chemical exposure. We live in a world filled with substances which can be irritating to our skin, and we use many of these irritating substances every day without great concern, because we have learned how to restrict our exposure.

The skin and the mucous membranes which cover the openings of our bodies to the external environment (such as in the nose and mouth), form protective barriers which keep water inside the body, and keep the outside (filled with bacteria, fungi, dust, dirt, etc.) from coming in. The skin is really an organ of the body, and a large one at that.

The skin is much more than just a simple covering, it is multi-layered, and underneath the surface (which is composed of dead cells), are other layers composed of living cells which react to irritants when they get through. When an irritant reaches these sensitive live skin cells, they can only respond in a limited number of ways, the first of which is a general response to any irritating chemical or physical agent (like sunlight); inflammation.

Contact Dermatitis and its Management

Introduction

During mixing, loading and application of pesticides, the skin is the most likely body surface to come into contact with the product. Many pesticides can be absorbed through the skin into the blood, and can cause toxic effects. The amount of pesticide absorbed through the skin (percutaneous absorption) may be enough to produce severe toxic reactions including death. In addition, pesticides can also injure the skin directly, a process known as cutaneous toxicity.

Inflammation has four components; redness, pain, heat and swelling. The degree of inflammation is a direct result of the degree of chemical or physical irritation (dose-response). If the damage is great enough to cause cell death, then the response will be much more severe, and can result in areas of the skin becoming "denuded" (loss of the layers, with the deeper layers being exposed to the surface). Because the response of the skin to many different physical and chemical irritants is similar, the causes of skin irritation must usually be diagnosed by a physician who specializes in skin problems (a dermatologist).

Cutaneous toxic reactions account for approximately 1/3 of all pesticide related occupational problems, however pesticides are not the only chemicals which can cause skin toxicity. For example, allergic dermatitis produced by poison oak is the most frequent cause of temporary disability in forestry workers.

Dermatitis means literally "inflammation of the

skin." Most often dermatitis is referred to as a skin "rash," however, this term is very non-specific. There are many different types of "rashes" and they differ quite a bit in the way they appear and in how they are produced.

Some of the more frequently encountered dermatitis problems in humans and food animals are primary irritant dermatitis and allergic contact dermatitis.

Contact Dermatitis

Definition

This type of dermatitis is caused by chemical substances that directly irritate the skin (like caustic acids or bases).

Symptoms

- Redness, itching, pain or as severe as blisters, with peeling and open wounds (ulcerations).
- The areas of direct contact are usually the most affected and this is one of the ways it is recognized.

Examples of plants and pesticides may cause primary irritant dermatitis :

Pesticides

Sulfur	Omite	Methomyl	Maneb	Weed Oil
Captafol	Folpet	Kelthane	Dinitro Benomyl	Dacthal
Endosulfan	Lindane	Zineb	Captan	Chlorothalonil
Toxaphene	Ziram	Dinoseb	TOK	Organophosphates
Chloropicin	Thiram	Triazine	Glyphosate	

Plants Flowers

Tomatoes	Dieffenbachia	Carrot	Castor Bean	Fig tree Sap
Mushroom	Rubber Tree	Daffodil	Cucumber	Buttercup
Parsnip	Foxglove	Turnip	Tulip bulb	Narcissus bulb
Parsley	Cowslip	Celery	Milkweed	

Treatment

1. Removal of the irritant by washing and prevention of further contact with the chemical.
2. Steroid creams : 0.5% hydrocortisone may

help alleviate pain and itching.

3. Exposure to the irritant is prevented
4. Appropriate protective equipment to completely prevent the development of primary irritant dermatitis.

Allergic Contact Dermatitis

- The best example of allergic contact dermatitis (ACD) is poison oak and poison ivy dermatitis. This cutaneous toxic reaction is a true allergic response because the skin must be sensitized by exposure to the chemical (once or many times) and the result is a localized allergic reaction.
- Not everyone will develop ACD after

exposure, and some workers may handle a potentially allergenic substance for years before ACD develops, or it may develop after a single exposure.

Symptoms

Redness, itching and small blisters to widespread blisters that overlap forming very large fluid filled blisters.

Examples of plants and pesticides that cause allergic contact dermatitis (ACD) :

Pesticides

Captan	Captafol	Benomyl	Dichlor- ovos	PCNB	Zineb	Maneb	Formal- dehyde
Naled	Thiram	Triazine	Parathion	Malathion	TOK	Cresol	Some natural pyrethroides

Plants Flowers Trees

Poison Ivy	Primrose	Cedar	Poison	Cashew Sumac	Chrys- anthe- mum	Onions	Garlic
Poison Oak	English Ivy	Pine	Tulip bulbs	Liverwort	Narci- ssus Bulbs	Lichens	Celery

Treatment

1. Thorough washing to remove the allergen (in the case of poison ivy and oak it is the oils in the plants)
2. Treatment to reduce the itching, pain and swelling.
3. A topical corticosteroid cream may be very effective in reducing the symptoms.
4. When large blisters break or are opened, care should be taken to prevent secondary infection of these raw areas.
5. Local anesthetic creams (containing benzocaine) should be avoided since they also can act as contact sensitizers (may also cause allergic dermatitis) and may also delay healing.

Photosensitization Dermatitis

There are two basic types of photosensitization dermatitis :

1. Contact phototoxic photosensitization :

- The most common occupational phototoxic reaction in humans is caused primarily by plants.
- This type of toxic reaction occurs when the photoactive chemical produced by the plant (or fungus) contacts the skin, is absorbed into the skin, and then activated by sunlight.
- The symptoms is the same as sunburn, and varies in intensity dependent on the amount of chemical exposure, and the amount of exposure to sunlight.

Plants which cause contact photo-sensitization :

Figs	Parsley	Carrots
Dill	Lime	Buttercup
Mustard	Klamath weed	Celery (with pink rot)

- Symptoms : redness, pain, blistering and,

following recovery, hyperpigmentation of the affected area.

- Some forms of toxic chemicals from plants are still used today to treat hypopigmentation (abnormally light pigmentation of the skin).

2. Photoallergic reaction: This disorder is very similar in appearance to allergic contact dermatitis; however, sunlight is required to initiate the process. It requires prior exposure to the chemical and sunlight, and is not very common. Clothing and sunscreen lotion may be helpful.

Signs and Symptoms and Management of Abhyanga Visha, Lepa Visha, Vastra Visha, Paduka Visha, Abharana Visha etc. with Contemporary Relevance

मुखगत विष (Poison in mouth)

मुखगे त्वोष्ठचिमिचिमा जिह्वा शूना जडा विवर्णा च ।
द्विजहर्षहनुस्तम्भास्यदाहलालागलविकाराः ॥

(च.चि. 23/113)

When ingested, these poisoned food and drinks cause Oshta Chimichima (tingling sensation in the lips), Jihva Shuna Jada Vivarna (swelling, numbness and discoloration of the tongue), Dvija Harsha (tingling sensation in the teeth), Hanu Stambha (stiffness of the jaw bones) and Daha Lala Gala Vikara (burning sensation in the face, salivation and morbidity in the throat).

स चेत् प्रमादान्मोहाद्वा तदन्नमुपसेवते ।
अष्टीलावत्ततो जिह्वा भवत्यरसवेदिनी ॥

(सु.क. 1/38)

If by mistake or by greed such a poisoned food is eaten, then the tongue becomes hard like the blacksmith's anvil, incapable to recognise tastes; there will be pricking pain, burning sensation and more of Kapha (saliva) flows out. In this condition treatments suggested for (poisoned) fumes and tooth brush should be done.

आमाशयगत विष (Poison in Small Intestine)

आमाशयं प्रविष्टे वैवर्ण्यं स्वेदसदनमुत्क्लेदः ।
दृष्टिहृदयोपरोधो बिन्दुशतैश्चीयते चाङ्गम् ॥

(च.चि. 23/114)

If the poisoned food and drinks have entered into the Amashaya (stomach), then the patient suffers from Vaivarnya (discoloration), Sweda (sweating), Sadana (asthenia), Utklesha (nausea), Drushti (impairment of the vision), Hrudayoparodha (arrest of cardiac functions) and Bindushatai Anga (appearance of drop like pimples all over the limbs).

मूर्च्छां छर्दिमतीसारमाध्यानं दाहवेपथू ।
इन्द्रियाणां च वैकृत्यं कुर्यादामाशयं गतम् ॥
तत्राशु मदनालाबुबिम्बीकोशातकीफलैः ।
छर्दनं दध्युदश्विद्ध्यामथवा तण्डुलाम्बुना ॥

(सु.क. 1/40)

Poison entering into Amashaya (stomach) produces Murccha (fainting), Chardi (vomiting), Atisara (diarrhoea), Adhmana (flatulence), Daha (burning sensation), Vepathu (shivering) and Indriya Vaikrutya (disorder of sense organs); then the person should be made to vomit by administering paste/ powder of Madana, Alabu, Bimbi or Koshataki mixed with either curd, dilute buttermilk or rice wash.

पक्वाशयगत विष (Poison in large intestine)

पक्वाशयं तु याते मूर्च्छामदमोहदाहबलनाशाः ।
तन्द्रा काश्यं च विषे पाण्डुत्वां चोदरस्थे स्यात् ॥

(च.चि. 23/115)

If the poisoned food and drinks enter into the Pakwashaya (colon), then the patient suffers from Murccha (fainting), Mada (intoxication), Moha (unconsciousness), Daha (burning sensation), Bala Nasha (weakness), Tandra (drowsiness) and Karshya (emaciation). The patient suffers from Pandu (anemia) when the poisoned food and drinks get localized in the abdomen.

दाहं मूर्च्छामतीसारं तृष्णामिन्द्रियवैकृतम् ।
आटोपं पाण्डुतां काश्यं कुर्यात् पक्वाशयं गतम् ॥
विरेचनं ससर्पिष्कं तत्रोक्तं नीलिनीफलम् ।
दध्ना दूषीविषारिश्च पेयो वा मधुसंयुतः ॥

(सु.क. 1/42)

Poison reaching the Pakvashaya (large intestine) produces Daha (burning sensation), Murccha (fainting), Atisara (diarrhoea), Trishna (thirst), Indriya Vaikrytya (disorders of the sense

organs), Atopa (gurgling noise in the abdomen), Pandu (yellowish-white colour) and Karshya (emaciation). Then Virechana (purgation) should be induced by using Niliniphala with ghee or Dushivishari Agada (described later) with curd and honey.

दन्तकाष्ठ विष (Poisoned tooth stick or brush)

विशीर्यते कूर्चकस्तु दन्तकाष्ठगते विषे ।
जिह्वादन्तौष्ठमांसानां श्वयथुश्चोपजायते ॥
अथास्य धातकीपुष्पपथ्याजम्बूफलास्थिभिः ।
सक्षौद्रैः प्रच्छिते शोफे कर्तव्यं प्रतिसारणम् ॥
अथवाऽङ्गोद्गमूलानि त्वचः सप्तच्छदस ।
शिरीषमाषका वाऽपि सक्षौद्राः प्रतिसारणम् ॥

(सु.क. 1/48-50)

Poisoned tooth stick loses its bristles, produces swelling of the tongue, teeth, gums and lips. Then the swelling should be incised (mildly) and applied with the paste of Dhataki Pushpa, Pathya, seed of Jambuphala added with Kshaudra (honey); or paste of root of Ankota or of bark of Saptachada or of seeds of Shirisha mixed with honey applied.

दन्तपवनस्य कूर्चो विशीर्यते दन्तौष्ठमांसशोफश्च ।
(च.चि. 23/116)

If the Danta Pavana (tooth brushing twig) is poisoned, when the brush like tip of it gets broken into small piece or dissolve and the patient suffers from Danta Oshtha Mamsa Shopha (edema of the teeth, lips and muscles of the mouth).

जिह्वानिलेखक विष (Poisoned tongue scraper)

जिह्वानिलेखकवलौ दन्तकाष्ठवदादिशेत् ॥
(सु.क. 1/ 50)

Symptoms and their treatment caused by poisoned tongue scraper and mouth gargles will be the same as those of the tooth brush.

अभ्यंग विष (Poisoned anointing or massage)

पिच्छिलो बहुलोऽभ्यङ्गो विवर्णो वा विषान्वितः ॥
स्फोटजन्मरुजास्त्रावत्वक्पाकः स्वेदनं ज्वरः ।
दरणं चापि मांसानामभ्यङ्गे विषसंयुते ॥
तत्र शीताम्बुसिक्तस्य कर्तव्यमनुलेपनम् ।
चन्दनं तगरं कुष्ठमुशीरं वेणुपत्रिका ॥
सोमवल्ल्यमृता श्वेता पद्मं कालीयकं त्वचम् ।

कपित्थरसमूत्राभ्यां पानमेतच्च युज्यते ॥
(सु.क. 1/51-54)

Oil for anointing, if poisoned, will be slimy, thick or of different colour; when used for anointing, it produces Sphota (eruptions), Ruja (pain), Trava (exudation), Tvakapaka (ulcer of the skin), Swedana (more of sweat), Jwara (fever) and Darana Mamsa (tearing of muscles). Treatment for this is pouring cold water on the body and then applying the paste of Chandana, Tagara, Kustha, Ushira, Venupatra, Somavalli, Amruta, Shveta, Padma, Kaliyaka, or Tvak, -made with juice of Kapittha and Gomutra; drinking water should also be processed with these drugs and used.

Poisoned material used in Utsadana, Parisheka Kashaya Anulepana

उत्सादने परीषेके कषाये चानुलेपने ।
शय्यावस्त्रतनुत्रेषु ज्ञेयमभ्यङ्गलक्षणैः ॥
(सु.क. 1/55)

Symptoms produced by poisoned materials used for Utsadana (massaging), Parisheka (bathing decoctions for bath), Anulepana (ointments), Shayya (bed), Vastra (cloths -dress) and protectives to the body (armour), when poisoned should be understood similar to those of anointing oil.

Poisoned material used in comb

केशशातः शिरोदुःखं खेभ्यश्च रुधिरागमः ।
ग्रन्थिजन्मोत्तमाङ्गेषु विषजुष्टेऽवलेखने ॥
प्रलेपो बहुशस्तत्र भाविताः कृष्णमृत्तिकाः ।
ऋष्यपित्तघृतश्यामापालिन्दीतण्डुलीयकैः ॥
गोमयस्वरसो वाऽपि हितो वा मालतीरसः ।
रसो मूषिकपर्ण्या वा धूमो वाऽगारसम्भवः ॥
(सु.क. 1/56-58)

If the comb is poisoned, symptoms produced are shedding of hairs, head- aches, bleeding from minute channels and development of tumours (enlargement of lymph glands) in the head. Treatment for this condition is application are often of the paste of black mud mixed with bile of Rushya (big deer), ghee, Shyama (Priyngu), Palindi (Triv[ut] and Tanduliyaka or juice of fresh cow dung or juice of Malati or Musikaparni is beneficial or exposure to smoke of the kitchen black.

Poisoned material used in Shirobhyanga, Shirstrana, Snana etc.

शिरोऽभ्यङ्गः शिरस्त्राणं स्नानमुष्णीषमेव च ।
स्वजश्च विषसंसृष्टाः साधयेदवलेखनात् ॥
(सु.क. 1/59)

Diseases produced by the use of poisoned materials of bath on the head, helmet, headwear and garlands will be the same as those indicated for the poisoned comb.

Poisoned material used in Mukha Lepa

मुखालेपे मुखं श्यावं युक्तमभ्यङ्गलक्षणैः ।
पद्मिनीकण्टकप्रख्यैः कण्टकैश्चोपचीयते ॥
तत्र क्षौद्रघृतं पानं प्रलेपश्चन्दनं घृतम् ।
पयस्या मधुकं फञ्जी बन्धुजीवः पुनर्नवा ॥
(सु.क. 1/60-61)

Use of poisoned cosmetics gives rise to Shyava (black colour) of the face and other symptoms mentioned under anointing; face becomes covered with thorny eruptions like those found in the lotus flower (Padmini Kanthaka). For this, drinking of honey and ghee mixed together, applying the paste of Chandana, Payasya, Madhuka, Phanji (Bharigi), Bandhujiva and Punarnava added with ghee is the treatment.

Poisoned material used for riding on animals

अस्वास्थ्यं कुञ्जरादीनां लालास्रावोऽक्षिरक्तता ।
स्फिक्प्यायुमेद्रमुष्केषु यातुश्च स्फोटसम्भवः ॥
तत्राभ्यङ्गवेदेष्टा यातृवाहनयोः क्रिया ।
(सु.क. 1/62)

If equipment's used for riding on animals is poisoned, animals like elephant etc. will become ill (Aswastha), have more salivation (Lalastrava) and Akshiraktata (redness of the eyes), the rider will develop Sphota (eruptions) on his Spika (buttocks), Payu (anus), Medhra (penis and scrotum); for this, treatments indicated for poisoned abhyanga oil should be done to both the rider and the animal.

Poisoned Nasya and Dhuma

शोणितागमनं खेभ्यः शिरोरुक्कफसंस्त्रवः ।
नस्यधूमगते लिङ्गमिन्द्रियाणां च वैकृतम् ॥
तत्र दुग्धैर्गवादीनां सर्पिः सातिविषैः शृतम् ।

पाने नस्ये च सश्वेतं हितं समदयन्तिकम् ॥
(सु.क. 1/63-64)

Bleeding from the orifices, Shiroruka (headache), Kaphastrava (more flow of Kapha), disorder of Kapha, Indriya Vaikruta (disorder of the sense organs) are the symptoms if nasal drops and smoke are poisoned; then milk and ghee of cow etc. boiled with Ativisha, Shveta (Katabhi) and Madayantika should be used for drinking and as nasal drops.

Poisoned Pusphamala (garland)

गन्धहानिर्विवर्णत्वं पुष्पाणां म्लानता भवेत् ।
जिघ्रतश्च शिरोदुःखं वारिपूर्णे च लोचने ॥
तत्र बाष्पेरितं कर्म मुखालेपे च यत् स्मृतम् ॥
(सु.क. 1/65-66)

If the garland has been poisoned, then the flowers are found devoid of Gandha (odour), Vivarna (changed in colour), and Mlanata (dull/withered). The person inhaling their smell will develop Shirodukha (headache) and Varipurna Lochana (eyes full of tears). For this, treatments indicated for poisoned smoke and cosmetic pastes should be done.

Poisoned oil for ears (Karnataila Visha Yukta)

कर्णतैलगते श्रोत्रवैगुण्यं शोफवेदने ।
कर्णस्रावश्च तत्राशु कर्तव्यं प्रतिपूरणम् ॥
स्वरसो बहुपुत्रायाः सघृतः क्षौद्रसंयुतः ।
सोमवल्करसश्चापि सुशीतो हित इष्यते ॥
(सु.क. 1/67-68)

When the oil to be filled into the ears is poisoned, the person will have disorders of hearing, swelling, pain and exudation of the ears. For this, ears should be filled with fresh juice of Bahupatra (Mayurashikha) added with ghee honey or juice of Somavalka filled cold is also beneficial.

Anjana Visha (Poisoned collyrium)

अश्रूपदेहो दाहश्च वेदना दृष्टिविभ्रमः ।
अञ्जने विषसंसृष्टे भवेदान्ध्यमथापि च ॥
तत्र सद्यो घृतं पेयं तर्पणं च समागधम् ।
अञ्जनं मेषशृङ्गस्य निर्यासो वरुणस्य च ॥
मुष्ककस्याजकर्णस्य फेनो गोपित्तसंयुतः ।
कपित्थमेषशृङ्गयोश्च पुष्पं भल्लातकस्य वा ॥

एकैकं कारयेत् पुष्पं बन्धूकाङ्कोटयोरपि ॥
(सु.क. 1/69-71)

If the collyrium is poisoned, it will produce more accumulation of waste in the eyes, Daha (burning sensation), Vedana (pain), Drushtivibhrama (disorders of vision and even blindness). Then the person should drink ghee and groats added with Magadha (Pippali), the resin of Mechashrigi and Varuna should be applied to the eyes as collyrium; or Mushkaka, Ajakarna and Samudraphena mixed with Gopitta (gorocana); or of Kapitha and Meshashrigi, or of flowers of Bhallataka or of Bandhuka and Utkata (each one separately) may be used as counter collyrium.

Paduka Visha (Poisoned footwear)

शोफः स्त्रावस्तथा स्वापः पादयोः स्फोटजन्म च ॥
भवन्ति विषजुष्टाभ्यां पादुकाभ्यामसंशयम् ।
उपानत्पादपीडनानि पादुकावत् प्रसाधयेत् ॥
(सु.क. 1/72-73)

When the footwear is poisoned, the wearer will have Shopha (swelling), Strava (exudation), Swapa Pada (loss of sensation), Sphota (eruptions) etc. in the feet without any doubt; similarly the use of poisoned foot rest and pillows: treatments for these are similar (according to symptoms).

Abharana Visha (Poisoned ornaments)

भूषणानि हतार्चीषि न विभान्ति यथा पुरा ।
स्वानि स्थानानि हन्युश्च दाहपाकावदारणैः ॥
पादुकाभूषणेषूक्तमभ्यङ्गविधिमाचरेत् ॥
(सु.क. 1/74)

If the ornaments are poisoned, then they lose their brightness, do not shine as before and damage their places by causing burning sensation, ulceration and bruises; for this anointing of the place etc. indicated under poisoned footwear should be adopted.

Signs and Symptoms and Management of Dermatological Manifestations due to Cosmetics, Chemicals, Occupational and Other Allergens

Skin is an essential and dynamic organ. In addition to performing important functions

including thermoregulation and preventing insensible water loss, it also has important metabolic, immunological and neurosensory properties. However, the predominant function of skin is to protect the body against a variety of toxicological insults. Animals are relatively less protective against such insults as compared to humans due to lack of clothing, inferior housing and different social interactions.

In most instances, the skin of animals directly contacts environmental, chemical and other pollutant exposure without the benefit of man-made protection. Although the largest organ of the body can often face these insults to a certain threshold, animals exhibit symptoms of dermal toxicity when this limit is passed.

Chemicals can be absorbed through skin and into the blood stream causing toxic effects. The chemicals may also cause reactions on the skin surface. Some individuals may be particularly sensitive to a compound or a plant and others may experience little or no effects from contact. Determining the cause of dermatitis may be easy or it may be difficult. If I knew I walked through poison ivy and I develop a reaction, the connection is fairly obvious. However, if I have worked in the garden, or the exterminator visited a week ago and I have developed a rash the connections are not as obvious.

Patchtes : Finding out just what has caused the dermatitis in which the patient's skin is exposed to small patches containing dilute solutions of the suspect agents. In this way, the offending chemical can be identified and measures taken to prevent or minimize future exposure.

The best way to prevent cutaneous toxicity is the appropriate and correct use of protective clothing, and the use of safe handling and application procedures.

Dermal absorption happens when a chemical goes through the skin and travels into the body. Many chemicals used in the workplace can damage organs if they penetrate the skin and enter the bloodstream. Examples of these chemicals include pesticides and organic solvents.

Allergens in Cosmetics

Cosmetic products (such as soaps, lotions, face and eye make-up, fragrances, etc.) can provoke allergic reactions in some people. Many people suffer from allergies and anyone at any age can develop allergies. Allergic reactions are the immune systems over reaction to substances that may otherwise be harmless. An allergen can trigger the immune system to release chemical substances such as antibodies that result in allergy symptoms. Many people are familiar with seasonal allergies brought on by pollen from blooming plants, or with food allergies. Allergic reactions to cosmetics most often appear as itchy, red rashes on the skin or contact dermatitis.

Symptoms of Allergic Reactions

Allergic reactions can range in severity, but may include:

- Urticaria, itchy skin, a rash, flaking or peeling skin, facial swelling, irritation of the eyes, nose and mouth, wheezing, and anaphylaxis.
- Symptoms of anaphylaxis include a lack of consciousness, shortness of breath, trouble swallowing, light-headedness, chest pain, a rapid, weak pulse, nausea, and vomiting.

In addition to allergic contact dermatitis, fragrance ingredients may also affect the respiratory system because they are essentially vapor and can be inhaled. This is especially true in patients with asthma, allergic rhinitis, and viral respiratory infections.

For people with sensitivities to certain fragrances, inhaling them may result in shortness of breath, the sensation of being suffocated, coughing, phlegm, a runny or stuffy nose, headache, chest tightness, and wheezing.

Diagnosis

Patch Test: This test is often used to diagnose dermatitis, or irritation and swelling of the skin. This test involves placing a small amount of allergen on the skin and covering it for 48 hours. A doctor will inspect the skin after 72 to 96 hours and check for signs of an allergic reaction, including, redness,

a rash, or hives. Based on the symptoms present, the physician can determine whether the patient has had an allergic reaction. If a patient has very sensitive skin, this type of testing may not be specific enough to help identify.

Skin Irritation-

Signs and Symptoms: Redness, burning, stinging, or a tingling sensation on the skin.

Management:

- Discontinue use of the product immediately.
- Wash the affected area with mild soap and water.
- Apply a soothing, fragrance-free moisturizer to help calm the skin.
- Avoid using any further cosmetic products until the irritation subsides.

Allergic Reactions:

Signs and Symptoms: Itchy, red, swollen, or hives-like skin.

Management:

- Stop using the cosmetic product that triggered the reaction.
- Wash the affected area gently with mild soap and water.
- Consider taking an antihistamine to reduce itching and inflammation.
- If the reaction is severe or does not improve, seek medical attention.

Acne Breakouts

Signs and Symptoms: Development of pimples, whiteheads, blackheads, or cysts.

Management:

- Discontinue using the cosmetic product and assess if it is causing the breakouts.
- Maintain a consistent skincare routine, including cleansing and moisturizing.
- Use non-comedogenic (won't clog pores) and oil-free products.

Contact Dermatitis

Signs and Symptoms: Red, itchy, or blistering

skin at the site of contact with the cosmetic product.

Management:

- Stop using the product that caused the reaction.
- Wash the affected area with mild soap and water.
- Apply a topical corticosteroid cream to reduce inflammation.

Dermatological Manifestation due to Dushivisha and Gara Visha

Dermatological manifestation due to Dushivisha

दूषीविषं तु शोणितदुष्ट्यारुःकिटिभकोठलिङ्गं च ।
विषमेकैकं दोषं संदूष्य हरत्यसूनेवम् ॥

(च.चि. 23/31)

Dushi Visha (a type of artificial poison) vitiates Shonita (blood) and produces symptoms like Aru (eczema in the head), Kitibha (psoriasis) and Kotha (urticaria). This type of poison afflicts each one of the Dosha and causes death of the patient. Repeated improper or excessive exposure to affected place, time, food, practice of improper sleep, day sleep causes Dushi Visha (poisonous effect) after period of time.

- **Acne and Pimples:** The accumulation of toxins in the body can lead to imbalances in the doshas (Vata, Pitta, and Kapha), which may manifest as skin conditions like acne and pimples.
- **Eczema:** Dushi Visha can disrupt the body's natural balance, leading to skin inflammation and conditions like eczema.
- **Psoriasis:** Ayurveda suggests that an accumulation of toxins can trigger an immune response that affects the skin, potentially leading to psoriasis.
- **Urticaria (Hives):** Allergic reactions to accumulated toxins can result in hives or urticaria.
- **Dermatitis:** Skin inflammation and irritation, including various forms of dermatitis, can be linked to imbalances and the accumulation of toxins.

- **Rashes:** Skin rashes, including contact dermatitis, can be associated with imbalances and toxins in the body.
- **Pruritus (Itching):** Itchy skin can be a common symptom of Dushi Visha-related dermatological issues.

In Ayurveda, the approach to treating dermatological manifestations due to Dushi Visha typically involves purifying the body through Panchakarma therapies, such as Vamana (therapeutic emesis) and Virechana (therapeutic purgation). Additionally, lifestyle and dietary modifications, as well as herbal remedies, are often prescribed to restore balance and eliminate toxins from the body.

Dermatological Manifestation Due to Garavisha

- **Allergic Reactions:** Exposure to toxins or allergens in the environment can lead to allergic skin reactions. This may include hives, itching, and redness.
- **Contact Dermatitis:** Contact with toxic substances can cause contact dermatitis, characterized by redness, itching, and sometimes blisters on the skin.
- **Eczema:** Garavisha exposure can trigger or exacerbate eczema, leading to skin inflammation, dryness, and itching.
- **Skin Rashes:** Various types of skin rashes, including those resulting from toxic plant exposures or environmental toxins, can occur due to Garavisha.
- **Photosensitivity:** Some toxins can make the skin more sensitive to sunlight, leading to sunburn or photosensitivity reactions.
- **Vitiligo and Other Pigmentation Disorders:** In Ayurveda, Garavisha is sometimes associated with conditions like vitiligo, which results in the loss of skin pigmentation.
- **Acne and Boils:** Toxins and impurities in the body can disrupt the balance of Doshas, leading to skin conditions such as acne and boils.

The treatment of Garavisha related dermatological manifestations involves purifying the body and eliminating toxins. This can include Panchakarma therapies, dietary changes, and the use of specific herbs to detoxify the body.

Dermatological manifestation due to Sthavara Visha

Sthavara Visha such as Kuchala, Ahiphena, Bhanga, Gunja, Jayapala etc. causes Daha (burning sensation), Shopha (swelling), Jihva Gaurava (heaviness in tongue), Netraraktata (redness of eye), Pitavarna (yellow colour of eye), Twaka Vivarna (skin discolouration) etc. symptoms would be reflected dermatologically.

Strong Acids- Corrosion, Burning and discolouration of skin (blackening)

Strong Alkalis- Causes blister and brownish discolouration of skin

Non-metallic Irritant- Haemorrhage, Tissue necrosis and blister formation, Irritation of skin

Metallic Irritant- Alopecia, nails and raindrops pigmentation. Itching, dermatitis, blue green discolouration of skin and gums.

Dermatological Manifestation Due to Bites and Stings

When the venom of Sarpa (snakes), Kita (insects), rats, lizards, scorpions, jokers, flies, grains, dogs, etc. comes into contact with the skin, symptoms such as Daha (burning sensation), Shotha (inflammation), Kandu (itching), Toda (pain), thrill, Paka, Twaka Vivarna (skin discoloration) etc. appear as dermatological manifestation.

- Sarpa Visha (Snake Poison)- Shotha (inflammation), bite site black colouration and

raised, Vedana (pain), Daha (burning sensation).

- Kita Visha (Insect venom)- Shotha (inflammation), Kandu (itching), Trava (discharge), Twaka Sphota (skin eruption).
- Makshika Visha (Bee venom)- Kandu (itching), Daha (burning sensation), Shopha (swelling), Ruja (pain), Pidika (eruption).
- Kanabha Visha - bite site black colouration, Shotha (inflammation), Vedana (severe pain).
- Manduka Visha (Frog venom) - Daha (burning), Kandu (itching).
- Gruhagodhika Visha - Toda (pain like a needle prick), Daha (burning sensation).
- Pipilika Visha (Ant poison) - Daha (burning), Agnisparshavata Shopha (swelling like a touch of fire).
- Mashaka Visha (Mosquito bite)- Tivra Kandu (intense itching), Shopha (swelling) at the bite site.
- Jalouka Visha - Kandu (itching) and Shopha (inflammation) at the bite site.
- Luta Visha - Herpes at the ten places, rashes, various types of swelling, pain, bleeding, decay of the bite site.
- Vrushika Visha (Scorpio venom)- Daha (burning) like burning in the country place, pain like piercing, blackening of the bite area and pain like needle pricking and tearing.
- Mushaka Visha (Rat poison)- Kleda, Shotha (inflammation).
- Alarka Visha – bite place numbness, itching, pain, discoloration, eruption, formation of Mandala and rupture of the lineage place.

Syllabus

1. Dushivishari agada
2. Bilwadi agada
3. Dashanga agada
4. Murvadi agada
5. Panchashirisha agada
6. Vishaghna mahakashaya (Charaka Samhita)
7. Ekasara gana (Sushruta Samhita)

Learning objective

1. Enlist ingredients and discuss the therapeutic utility of Dushivishari Agada, Bilwadi Agada, Dashanga Agada, Murvadi agada and Panchashirisha Agada.
2. Enlist and discuss the ingredients of vishaghna Mahakashaya (Charaka Samhita) and ekasara gana (Sushruta Samhita).

Total - 1 hours (Lecture :01 hour, Non-lecture: 00 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

Dushivishari Agada

दूषीविषार्तं सुस्विन्नमूर्ध्वं चाधश्च शोधितम् ।
पाययेतागदं नित्यमिमं दूषीविषापहम् ॥
पिप्पल्यो ध्यामकं मांसी शावरः परिपेलवम् ।
सुवर्चिका ससूक्ष्मैला तोयं कनकगैरिकम् ॥
क्षौद्रयुक्तोऽगदो ह्येष दूषीविषमपोहति ।
नाम्ना दूषीविषारिस्तु न चान्यत्रापि वार्यते ॥
(सु.क. 2/50-52)

The person suffering from effects of Dushi Visha (weak poison) should be Swedana (sudation) greatly, purified both the way Vamana (emesis) and Virechana (purgation) then be made to consume Agada to remove the poison.

Ingredients- Pippali (Piper longum Linn.), Dhyamaka (Cymbopogon martinii(Roxb.) Wats.), Jatamamsi (Nardostachys jatamamsi (D.Don)DC.), Lodhra (Symplocococus racemosa Roxb.), Ela (Elettariacardamomum Maton.), Suvarchika (Salt petre), Kutannatum(Oroxylum indicum (L.) Benth. ex Kurz), Natam (Valerianawallichii), Kushta

(Saussurea lappa DC.), Yastimadhu (Glycyrrhiza glabra L.), Chandana (Santalum album L.) and Gairika (Red Ochre) these should be made into powder or decoction and administered mixed with Madhu (honey).

Anupana – Madhu (Honey)

Indications- Dushivisha (Cumulative toxicity)

Bilwadi Agada

बिल्वस्य मूलं सुरसस्य पुष्पं फलं करञ्जस्य नतं सुराह्वम् ।
फलत्रिकं व्योषनिशाद्वयं च बस्तस्य मूत्रेण सुसूक्ष्मपिष्टम् ॥
भुजङ्गलूतोन्दुरवृश्चिकाद्यैविसूचिकाजीर्णगरज्वरैश्च ।
आर्तान्नरान् भूतविधर्षितांश्च स्वस्थीकरोत्यञ्जनपाननस्यैः ॥
(अ.ह.उ. 36/84-85)

Ingredients and method of preparation- Roots of Bilva, flowers of Surasa, fruits of Karanja, Nata, Surahvam, Phalatrika, Vyosha, the two Nisha, all macerated in goat's urine and made into a nice paste.

Indications- Used as Anjana (collyrium), Pana

(internal potion) and Nasya (nasal medication), this medicine cures the poison of bites of Sarpa (snake), Luta (spider), Undara (mice), Vrushchika (scorpion), etc. and Visuchika (simultaneous vomiting and diarrhoea), Ajirna (indigestion), Gara (artificial poison) and Jwara (fevers), makes the persons suffering from possession of evil spirits healthy again.

Dashanga Agada

वचा हिङ्गु विडङ्गानि सैन्धवं गजपिप्पली ।
पाठा प्रतिविषा व्योषं काश्यपेन विनिर्मितम् ।
दशाङ्गमगदं पीत्वा सर्वकीट विषं जयेत् ॥

(अ.ह.उ. 37/27-28)

Ingredients and method of preparation-

Vacha, Hingu, Vidanga, Saindhava, Gajapippali, Patha, Prativisha, Vyosha, are made into nice paste and rolled into pills.

Indication- This Dashanga Agada formulated by Kashyapa Acharya cures the poisons of all kinds of insects.

Murvadi Agada

मूर्वामृतानतकणापटोलीचव्यचित्रकान् ॥
वचामुस्तविडङ्गानि तक्रकोष्णाम्बुमस्तुभिः ।
पिवेद्रसेन वाऽम्लेन गरोपहतपावकः ॥

(अ.ह.उ. 35/57-58)

Ingredients and method of preparation-

Powder of Murva, Amruta, Nata, Kana, Patoli, Chavya, Chitraka, Vacha, Musta and Vidanga, mixed with either Takra (butter milk), Ushna Jala (warm water), Mastu, meat soup or sour liquid.

Indication- Consumed by the person having fire destroyed by Gara (artificial poison).

Panchashirisha Agada

शिरिषफलमूलत्वक्पुष्पपत्रैः समैर्धृतैः ।
श्रेष्ठः पञ्चशिरिषोऽयं विषाणां प्रवरो वधे ॥
इति पञ्चशिरिषोऽगदः ।

(च.सं.चि. 23/218)

Ingredients and method of preparation-

The Panchanga (five parts) Phala (fruit), Mula (root), Twaka (bark), Pushpa (flower) and Patra (leaf) of

Shirisha taken together in equal quantity is known as Pancha Shirisha Agada.

Indication- This formulation is one of the best to destroy the poison.

Vishaghna Mahakashaya (Charaka Samhita)

हरिद्रामञ्जिष्ठासुवहामृक्ष्मलापालिन्दीचन्दनकतकशिरिष-
पसिन्धुवारश्लष्मातका इति दशोमानि विषघ्नानि भवन्ति ।

(च.सं.सू. 4/11/16)

Ingredients - Haridra (Curcuma longa), Manjistha (Rubia cordifolia Linn.), Suvaha/Rasna (Operculina turpethum), Sukshma Ela (Elettaria cardamomum Maton.), Palindi/Shyamalatha (Ichnocarpus frutescens (Linn.) R.Br. /Operculina turpethum), Chandana (Santalum album), Kathaka (Strychnos potatorium Linn. f.), Shirisha (Albizia lebeck Benth.), Sindhuvara (Vitex negundo) and Shleshmataka/Bahuvara (Cordia dichotoma Forst. f.) these ten drugs cure Visha Roga (toxic conditions).

Indication- This formulation is one of the best to destroy the poison.

Ekasara Gana (Sushruta Samhita)

सोमराजीफलं पुष्पं कटभी सिन्धुवारकः ।
चोरको वरुणः कुष्ठं सर्पगन्धा सप्तला ॥
पुनर्नवा शिरिषस्य पुष्पमारग्वधाकंजम् ।
श्यामाऽम्बुषाविडङ्गानि तथाऽम्राश्मन्तकानि च ॥
भूमी कुरवकश्चैव गण एकसरः स्मृतः ।
एकशो द्वित्रिशो वाऽपि प्रयोक्तव्यो विषापहः ॥

(सु.क. 5/85-86)

Ingredients Fruits and flowers of Somaraji (Bakuchi), Katabhi, Sindhuvaraka, Choraka, Varuna, Kustha, Sarpagandha, Saptala, Punamava, flowers of Shirisha, Aragvadha and Arka; Shyama, Ambastha, Vidanga, Amra (Beeja), Ashmantaka, Bhumi (mud) and Kurabaka; these together is known as Ekasara Gana (group of drugs).

Indication- Ekasara Gana may be used singly or in combination of two or three, to destroy poisons.

Syllabus

1. Cardiac Poisons - Vatsanabha, Karaveera, Digitalis, Tobacco and Cerbera odollam.
2. Neurotoxic Poisons- Kupeelu, Ahipheena, Dhattura, Bhanga.
3. Irritant Poisons - Jayapala, Gunja, Bhallataka, Arka, Snuhi, Langali.

Learning objectives

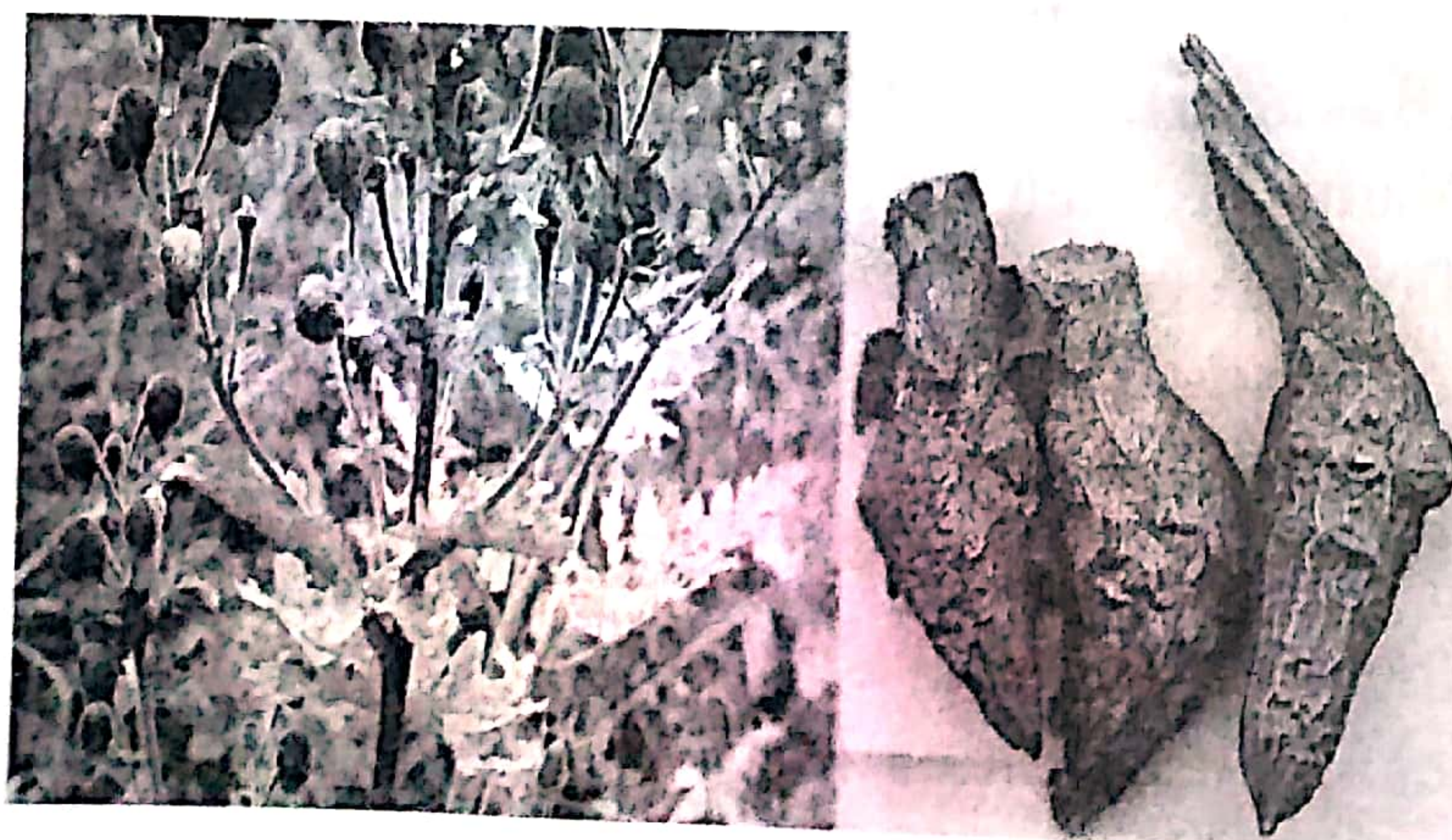
1. Describe the active principles, mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of vatsanabha.
2. Mention therapeutic dose and enlist two important formulations of vatsanabha.
3. Describe the active principles, mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of karaveera.
4. Mention therapeutic dose and enlist two important formulations of karaveera.
5. Describe mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of digitalis.
6. Describe mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of tobacco.
7. Describe mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of Cerbera odollam.

Total - 6 hours (Lecture :04 hour, Non-lecture: 02 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- Yes

**Cardiac Poisons - Vatsanabha,
Karaveera, Digitalis, Tobacco and
Cerbera Odollam**

Vatsanabha (Aconitum Ferox)



Botanical name : Aconitum ferox, Aconitum Napellus

Family : Ranunculaceae

Varga (group)- Visha Varga (group of toxic substances)

Kula (family)- Vatsnabha Kula (Ranunculaceae)

Type of poison- Cardiac poison

Synonyms- Vatsanaga, Monks hood, aconite, Visha, Amruta, Kshveda, Garala

Toxic Parts : Root (more toxic), Seeds and

Toxic Principles : Aconitine, mesoaconitine, hypoa-conitine, pseudoaconitine, aconine.

Mechanism of Action

- Open sodium channels and inhibits complete

repolarization of the membrane of myocardial tissue.

- Stimulates vagal medullary centre.

Fatal dose: 1-2 gm of root, 250 mg extract, 25 drop of tincture, 4 mg alkaloid

Fatal period: 20 minutes to 24 hours (average 6 hours)

Signs and symptoms

1. Nausea and vomiting, diarrhoea
2. Salivation
3. Tingling and numbness in mouth and lips
4. Palpitation, weakness
5. Hypotension
6. Ventricular ectopic
7. Arrhythmias
8. Vertigo
9. Blurring of vision, mydriasis, xanthopsia
10. Convulsions.

Management

- Gastric lavage with activated charcoal
- Benzodiazepines for convulsions
- Symptomatic treatment.
- Patola Swarasa one Pala with sugar

Post-mortem appearance

- No specific finding
- Organs are congested.

Medicolegal aspects

- Ideal homicidal poison - because it is sweet in taste and can easily be given with foodstuff.
- Suicide
- Accidental poisoning
- Root used to procure abortion
- Arrow poison
- Cattle poison
- Aconite not detected in chemical analysis.

Therapeutic Dose - One Sarshapa - 1/16-1/18 Ratti, purified Vatsanabha (60-125mg)

Formulations-

- Tamra Parpti- Used in the treatment of

anemia, skin diseases etc.

- Sanjivini Vati- Used in dyspepsia, indigestion
- Tribhuvana Kriti Rasa- Used in Jwara (acute and chronic fever)
- Ananda Bhairava Rasa- Jwara (fever), Kasa (cough), Atisara (diarrhoea), Ajirna (indigestion), Prameha (DM)
- Mrityunjaya Rasa- Jwara (fever)
- Hinguleshwara Rasa- Jwara (fever), Shiroruja (headache), Angamarda (body ache)

Karaveera (Nerium Indicum)



Botanical name : Nerium Indicum

Family : Apocynaceace

Kula (family)- Kutaja Kula

Types- Shweta and Pita

Synonyms- Asvamaraka, Hayamara, Haya-maraka, Chandataka, pratihara, abjabijabhuta.

Toxic Parts : All part of plant but root is more toxic

Toxic Principles

Thevetia nerifolia	Nerium odorum
Thevatin A, B	Oleandrin
Oleandrin	Neriin
Nerifolin	Neriodrorin
Cerberia	Folinerin

Mechanism of Action: The cardiac effects of the glycosides are due to direct cardiotoxicity and an indirect effect via the vagal nerve.

Fatal dose: Seeds- 8-10, Twaka Churna- 15-20 gm, 15-20 gm of root, 5-15 leaves.

Fatal period: 24 hours

Signs and symptoms- Vomiting, abdominal pain, frothy salivation, restlessness, slow and weak pulse, lock jaw, exhaustion and drowsiness, coma, finally death.

Management

- Mahisha Dadhi with sugar
- Mahisha Dugdha with sugar
- Arka Twaka Churna with water
- Immediate gastric lavage by tannic acid and give activated charcoal.
- Maintain vitals by arrhythmias and electrolyte disbalance.
- Life supportive procedure and symptomatic treatment

Post-mortem appearance-

- Organ congested
- Haemolysis of RBC
- Renal tubules blocked by haemoglobin

Medicolegal aspects-

- Seeds are used for suicidal poisoning
- Root used for causing abortion
- Cattle poison

Therapeutic Dose -30-125 mg per day

Formulations

- Manikya Rasa- Skin disease and fever
- Chitrakadi Taila- Fistula
- Brihata Marichadi Taila- spondylosis, sciatica.
- Kasisadi Taila - skin diseases

Hrutpatti (Digitalis)

Botanical name : Digitalis purpurea

Family : Scrophulariaceae

Kula (family)- Katuka Kula

Type of poison- Cardiac poison

Synonyms- Tila Pushpi, Foxglove, lady's glove, common foxglove, purple foxglove

Toxic Parts : Leaves



Toxic Principles : Cardiac glycoside-digoxin, digitalis, digitoxin

Mechanism of Action

1. Unintentional
2. Suicidal or homicidal
3. As folk medicine

Fatal dose: Digitoxin = 03 mg, Digoxin = 15 mg and Digitalis = 02 mg

Fatal period: 30 minutes to 24 hours

Signs and symptoms- Vomiting, Loss of appetite, Contusion, blurred vision, Changes in colour perception, Nausea, Diarrhoea, Xanthopsia, Drooling, Cardiac arrhythmias, Weakness, Dilated pupils, Tremors.

Complication : Irregular heartbeat, heart failure

Management

1. Supportive care
2. Activated Charcoal
3. Atropine
4. Antidote: Digoxin-specific antibody fragments.

Post-mortem appearance- Signs of asphyxia

Medicolegal aspects- Accidental poisoning, Stupefying poison

Therapeutic Dose -leaf powder- 500mg, alcoholic extract- 5-15mg.

Formulations

- Jatiphaladi Churna
- Madanodaya Modaka
- Trailokyasammohana Rasa
- Trailokyavijaya Vati

Tobacco (Tambaku- Nicotina Tabacum)

It is prepared from cured leaves of *Nicotina tabacum*.

Botanical name : *Nicotina Tabacum*

Family : Solanaceae

Kula (family)- Kantakari Kula

Type of poison- Cardiac poison

Synonyms- Gucchaphala, Kalanja, Tamala

Toxic Parts : Leaves

Toxic Principles : Cerberin (alkaloid toxin), Nicotine, nornicotine. Nicotine is colorless, volatile, bitter and hygroscopic liquid.

Mechanism of Action

1. Nicotine receptors present in autonomic ganglia, adrenal medulla, central nervous system, spinal cord, neuromuscular junction and
2. Chemo-receptors of carotid and aortic bodies.

Absorption, Metabolism and Excretion

- Absorption - from skin, mucous membrane and lungs
- Metabolism - in liver
- Excretion - via urine and milk.

Fatal dose: 40-60 mg of nicotine, 15-30 gm of crude tobacco, 1-2 drop of pure nicotine.

Fatal period: 5-15 minutes

Signs and symptoms- Nausea, Severe retching, Vomiting, Abdominal pain, Diarrhoea, Blurred vision, Bradycardia, Irregular breathing

Management- Stomach wash, Atropine, Management of hyperkalemia

Post-mortem appearance- Signs of asphyxia, Brownish froth, Congestion of GIT, Pulmonary oedema

Medicolegal aspects- Accidental poisoning, Malingering

Uses

1. Smoking tobacco
2. Chewing
3. Snuff
4. Insecticide

Therapeutic Dose- 1 to 2 gm

(A) Acute Poisoning

1. Nausea and vomiting, diarrhoea, pain in abdomen
2. Salivation
3. Anxiety, headache, blurred vision, confusion
4. Tachycardia followed by bradycardia
5. Convulsions, paralysis, coma

(B) Chronic Poisoning

1. Found in nicotine addiction and common among smokers, tobacco chewers.
2. Develops physical dependence, manifested by recurrent craving for tobacco, tolerance, cough, impaired memory and amblyopia.
3. Tobacco withdrawal is manifested by change in mood, insomnia, restlessness, constipation, headache and anxiety.

Complications

- Carcinoma of lung, oesophagus, mouth, larynx
- Smokers cough, bronchitis
- Thromboangiitis obliterans
- Tobacco amblyopia

Maternal Smoking causes

- Increased risk of spontaneous abortion

- Fetal death
- Increased frequency of abruptio placentae or placenta previa
- Low birth weight baby

Management

1. Gastric lavage with activated charcoal
2. Benzodiazepines for convulsions
3. Symptomatic treatment.

Postmortem appearance

1. Brownish stains may present over skin
2. Brownish froth at mouth and nostrils
3. Signs of asphyxia
 - Tobacco smell may present
 - Brownish discoloration of esophagus and gastric mucosa
 - Stomach may contains fragments of tobacco leaves
 - Pulmonary edema

Medicolegal Importance

1. Accidental poisoning may occur due to overdose
2. Occupational hazard
3. Malingering to induce illness
4. Suicidal or homicidal

Cerbera Odollam



Botanical name : Cerbera Odollam

Family : Apocynaceae

Synonyms-

Toxic Parts : fruit

Toxic Principles : Cerberin (alkaloid toxin)

Mechanism of Action- The kernels of C. odollam contain cerberin, a digoxin-type cardenolide and cardiac glycoside toxin that blocks the calcium ion channels in heart muscle, causing disruption of the heartbeat, most often fatally.

Fatal dose: Kernel of one fruit

Fatal period: 1 to 2 days

Signs and symptoms

- Bitter taste in mouth
- Nausea, vomiting, abdominal pain, diarrhoea
- Irregular respiration, bradycardia
- Collapse
- Death
- Management-
 - Gastric lavage
 - Intravenous administration of molar solution of sodium lactate to combat acidosis and 5 percent glucose solution with 1.2 mg of atropine, 2 ml of adrenaline 1:1000 and 2 mg of nor adrenaline (if blood pressure is low) to combat heart block.
 - Symptomatic treatment.

Post-mortem appearance-

- 1. Signs of gastrointestinal irritation
- 2. Congestion of organs.

Medicolegal aspects

1. Poisoning - to commit suicide in dowry cases.
2. Accidental poisoning in children.
3. Homicidal poisoning by adding the powdered kernel to alcohol.

Therapeutic Dose- used as external application

Formulations- used as an insecticide, pesticide, or antifungal agent

Neurotoxic Poisons- Kupeelu, Ahiphena, Dhattura, Bhang

Learning objectives- Describe the active principles, mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of Kupeelu.

Mention therapeutic dose and enlist two important formulations of kupeelu. Describe the active principles, mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of ahiphena. Mention therapeutic dose and enlist two important formulations of ahiphena. Describe the active principles, mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of dhatura. Mention therapeutic dose and enlist two important formulations of dhatura. Describe the active principles, mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of Bhanga. Mention therapeutic dose and enlist two important formulations of bhanga.

Kupeelu



Botanical name : Strychnos nux vomica

Family : Loganiaceae

Kula (family)- Karashara Kula

Varrities- Strychnos Wallichiana and Strychnos Ignatii

Type of poison- Neurotoxic Poisons

Synonyms- Vishamushtika, Vishatinduks, Kakapilu, Dogbuttons

Toxic Parts : Seed and bark.

Toxic Principles

- Seed contains- Strychnine, Brucine
- Root, stem, bark and leaves contains: Brucine, Lagonin
- **Absorption-** from gastrointestinal mucosa and nasal mucosa
- **Metabolism-** in liver.

- **Excretion-** mainly by kidneys with traces in bile, milk and saliva.

Mechanism of Action

- Strychnine antagonizes the inhibitory neurotransmitter amino-acid glycine at postsynaptic receptors.
- Inhibitory glycine receptors are abundant in the spinal cord and brain stem where they are mainly involved in regulation of motor functions. When inhibitors are blocked, ongoing neuronal excitability is increased and sensory stimuli produce exaggerated reflex effects thus producing powerful muscle contractions.

Fatal dose: 1 to 2 crushed seeds, strychnine- 50 to 100 mg

Fatal period: 1 to 2 hours

Signs and symptoms

- Stiffness - spasm of jaw and neck
- Twitching - back stiffness
- Convulsions, breathlessness

Complication

- Hypoxia Strychnine antagonizes the inhibitory neurotransmitter
- Hyperthermia
- Rhabdomyolysis
- Metabolic acidosis/ lactic acidosis

Causes of death

- Medullary paralysis due to hypoxia
- Respiratory failure due to spasm of respiratory muscles

Differential diagnosis

1. Tetanus
2. Rabies
3. Meningitis
4. Cocaine intoxication
5. Phenothiazine poisoning
6. Phencyclidine
7. Hysteria

Management

1. Patient should be managed in calm environment.
2. Activated charcoal
3. Lorazepam or diazepam in convulsion.
4. Symptomatic treatments.

Post-mortem appearance

- Rigor mortis- appear and disappear early
- Postmortem caloricity
- Signs of asphyxia
- Froth at mouth
- Serosal surface may show hemorrhagic areas
- Occasionally muscle may show hemorrhages or evidence of rupture
- Spinal cord is congested.
- Organs are congested.

Medicolegal aspects

1. Accidental poisoning
2. Strychnine consumption as it is considered as aphrodisiac.
3. Homicide rare
4. Used to kill cattle.

Therapeutic Dose- below 30 mg

Formulations

- Shulaharana Yoga
- Ekanga Veera Rasa
- Vishatinduka Taila
- Vishamushti Vati
- Karaskara Ghrita
- Agnitundi Vati
- Kupeelu Lepa
- Karaskara Taila

Ahiphena (Papavor Someniferum)

Botanical name : Papavor someniferum

Family : Papaveraceae

Kula (family)- Ahiphena Kula

Type of poison- Neurotoxic Poisons

Synonyms- Aphima, Aphuka, Nagaphena

**Toxic Parts**

Toxic Principles : Morphine, codeine, Papaverine etc.

Mechanism of Action- Cocaine is CNS stimulant

Absorption - From oral, nasal and respiratory site

Metabolism - By liver

Excretion - Through urine.

Fatal dose: crude opium -1 to 2 gm, tincture opium- 3-4 ml, Morphine- 60-180 mg, Heroin- 20-30mg

Fatal period: 45 min- 12 hours

Routes of Administration

1. Chewing -coca leaves
2. Pyrolysis (smoking)
3. Snorting
4. Intravenous injection
5. Ingestion

Signs and symptoms**Management**

1. Bruhatkshudra Rasa one Phala Matra with milk
2. Gastric lavage by potassium permagnate
3. Hyperthermia managed by cooling blanket/ ice water sponging/ice water bath
4. Diazepam or lorazepam in Convulsions

5. Beta-blockers in tachycardia
6. Calcium channel blockers, nitrates in angina
7. Lidocaine in ventricular arrhythmias
8. Supportive measures
9. Use of antidote- Naloxone (0.4-2 gm), Nalorphine (5-10 gm)

Post-mortem appearance

- Signs of asphyxia
- Nasal septum ulceration and perforation
- Multiple scar marks at injection site in chronic abuser
- Hepatic necrosis in coca paste smokers.
- Myocardial infarction.

Medicolegal aspects

- Drug of abuse
- Body may get decompose rapidly
- Accidental deaths are common due to overdose or adulteration
- Provoke the users for violent behaviour. Acute intoxication may cause person to be aggressive and paranoid.
- Prostitutes may place cocaine solution into vagina to produce local constriction and causes intoxication.

Body packer syndrome : Cocaine smuggler fills the drug in packet or polythene bag and swallowed to conceal the contraband. The packets may cause intestinal obstruction and sudden death due to rupture of the bag within gastrointestinal tract.

Body stuffer syndrome : Person who smuggled the cocaine, on the verge of being arrested for possessing cocaine, swallows the drug to conceal the evidence. This act causes cocaine poisoning.

Amphetamine

Amphetamine is a powerful CNS stimulator. It acts on norepinephrine release in brain, along with an action on release of dopamine and serotonin. Amphetamine abuse may cause.

A) **Acute intoxication** -Symptoms of acute intoxication are

- i) Cardiovascular → Tachycardia, hypertension, Cardiac failure, Cardiovascular shock.
- ii) CNS- Euphoria, seizures, hyperpyrexia, tremors, ataxia, pupillary dilatation.
- iii) Neuropsychiatric- Anxiety, panic, insomnia, restlessness, irritability.
- iv) Auditory or visual hallucination

B) **Chronic abuse** :- It causes

- i) Severe and compulsive craving for the drug.
- ii) Cycle of 'Runs' (heavy use for several days) followed by 'Crashes' (stopping the drug use).
- iii) Tactile hallucination.

Therapeutic Dose - opium- purified resin- 30-125mg, Churna (powder)-1-2gm, seeds-2-5gm

Formulations

- Nidrodaya Rasa
- Ashtakshari Gulika
- Trivang Bhasma
- Karpura Rasa
- Grahanikapata Rasa
- Trivikarma Rasa
- Agnikumara Rasa
- Visuchika Vatika

Dhattura (Datura Metel- Fastuosa and Alba)



Botanical name : Datura alba

Family : Solanaceae

Kula (family)- Kantakari Kula

Type of poison- Neurotoxic Poisons

Synonyms- Dhuttura, Kanaka, Kanakahvya, Shivapriya, Mahamohi, Kantaphala, Ghanta-pushpa.

Toxic Parts : Seeds and flowers

Toxic Principles : Scopolamine, Hyoscyamine, Atropin

Mechanism of Action

Fatal dose: 50-100 seeds, 10-100 mg morphine.

Fatal period: 2 hours

Signs and symptoms

- Earliest symptom is bitter taste in the mouth
- After delirium passes of patient may progress to stupor or coma and rarely death may occur from respiratory paralysis.
- Cornpicker's pupil : It is unilateral mydriasis caused by pollen.

9D

1. Dry hot skin : Hot as a hare.
2. Dilatation of cutaneous blood vessels causing facial flush. Red as a beet.
3. Dilatation of pupil with loss accommodation and unresponsive to light (Dilated and fixed pupil) : Blind as a bat.
4. Dryness of throat and mouth : Dry as a bone.
5. Delirium (Muttering delirium) : Mad as a wet hen.
6. Drowsiness
7. Drunken gait
8. Dysphagia (Difficulty in swallowing)
9. Difficulty in talking.

Management

- Treat the patient in quiet and dark environment
- Gastric lavage with activated charcoal
- Catheterization of bladder
- Purgative is given, even if patient is treated 24 hours after ingestion because intestinal motility is decreased

- Monitor and regulate patient's temperature
- Hyperpyrexia hydration, cold sponging
- Agitation can be controlled with judicious use of diazepam/lorazepam.
- Antidote is physostigmine. Intravenous physostigmine is given slowly over 5-10 minutes if hyperthermia, delirium, convulsions, hypertension and arrhythmias occurred.

Post-mortem appearance

1. Signs of asphyxia
2. Gastrointestinal tract shows inflammation
3. Seeds or fragments may be found in stomach
4. Pulmonary oedema

Medicolegal aspects

- Accidental death may occur since datura seeds may be mistaken for chilly seeds.
- Suicide → rare
- Homicide

Railroad poison: Dhatura seeds are used as stupefying agent to rob people (mix with food or drinks).

- Used as love philter or potions.
- Dhatura seeds are abused in smoking.
- Dhatura seed resist putrefaction of body
- Criminal responsibility: Dhatura produces temporary insanity.
- Scopolamine is used as truth serum.

Therapeutic Dose-Seed after purification- 50-100 mg, root powder 62.5 -250mg

Formulations

- Dhardhurapatradi Taila
- Vishagarbha Taila
- Kanakasava

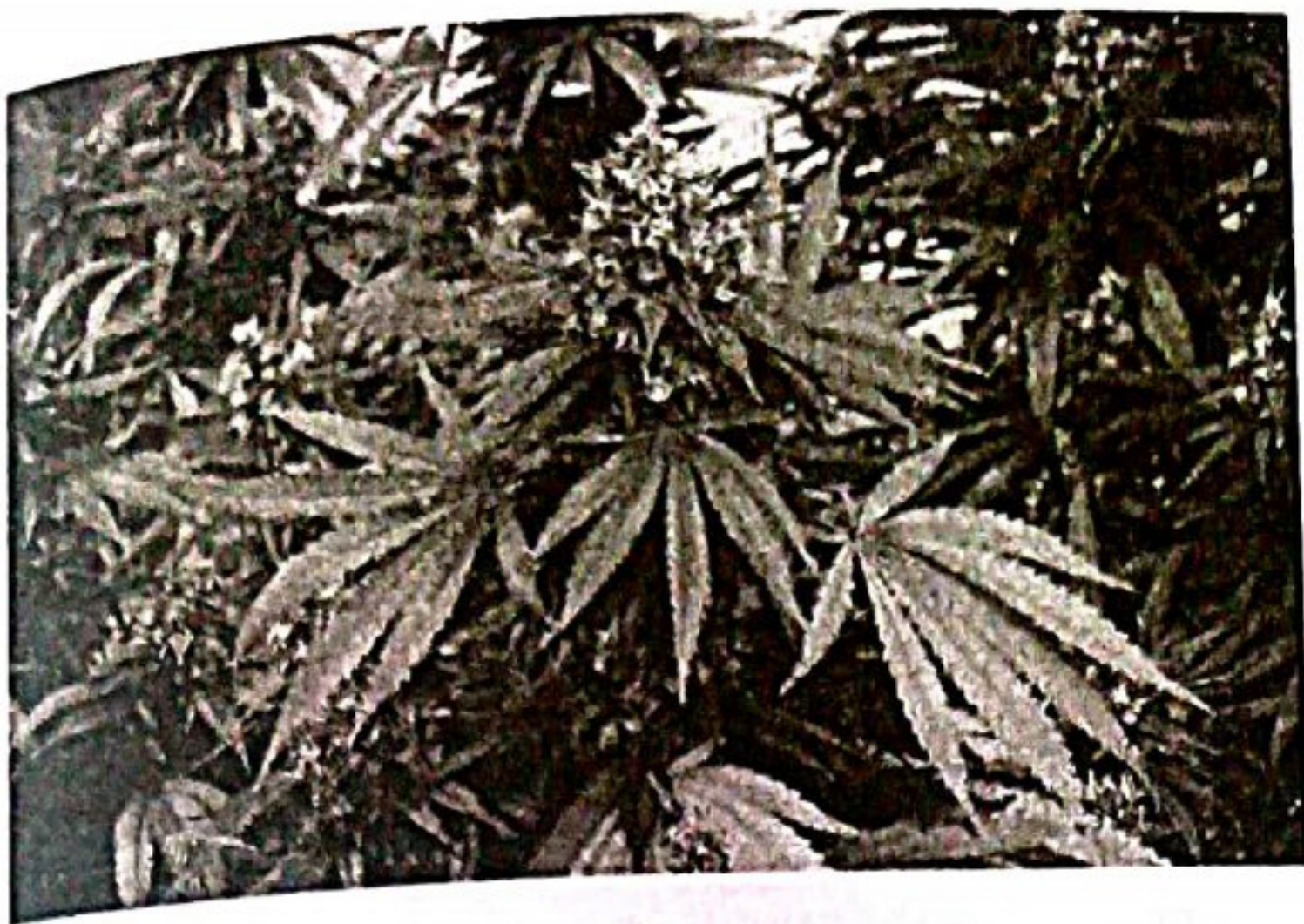
Bhanga (Cannabis Sativa)

Botanical name : Cannabis sativa

Family : Cannabaceae

Kula (family)- Bhanga Kula

Type of poison- Neurotoxic Poisons



Synonyms- Marijuana

Toxic Parts : Leaves

Toxic Principles : Cannabinol, Cannabidiol, Cannabichromene

Form : Part of cannabis sativa/indica from which obtained

Bhanga : Dried leaves and fruit shoots.

Ganja : Dried flowering tops of female plant.

Charas (Hashis) : Resinous exudates from leaves and stem of plant

Mechanism of Action

Absorption : GIT and respiratory tract (smoke), subcutaneous or intramuscular injection.

Metabolism : in liver

Excretion : in urine, feces and bile.

Fatal dose: Charas-2 gm /kg body weight

Ganja- 8gm/kg body weight

Bhanga-10gm/kg body weight

Fatal period: about 12 hours

Signs and symptoms

Management

1. Gut decontamination
2. Benzodiazepines for paranoia
3. Haloperidol for acute psychotic state
4. Supportive measures.

Post-mortem appearance

1. Signs of asphyxia
2. Unabsorbed bhang may be identified in the stomach.

Medicolegal aspects

- Drug of abuse
- Acute intoxication causes impairment in motor skills and judgment, affects vision and perception of time and space. Therefore, it may be dangerous to drive a vehicle under the influence of cannabis.
- Cannabis is known to induce suicidal ideation
- Homicidal.

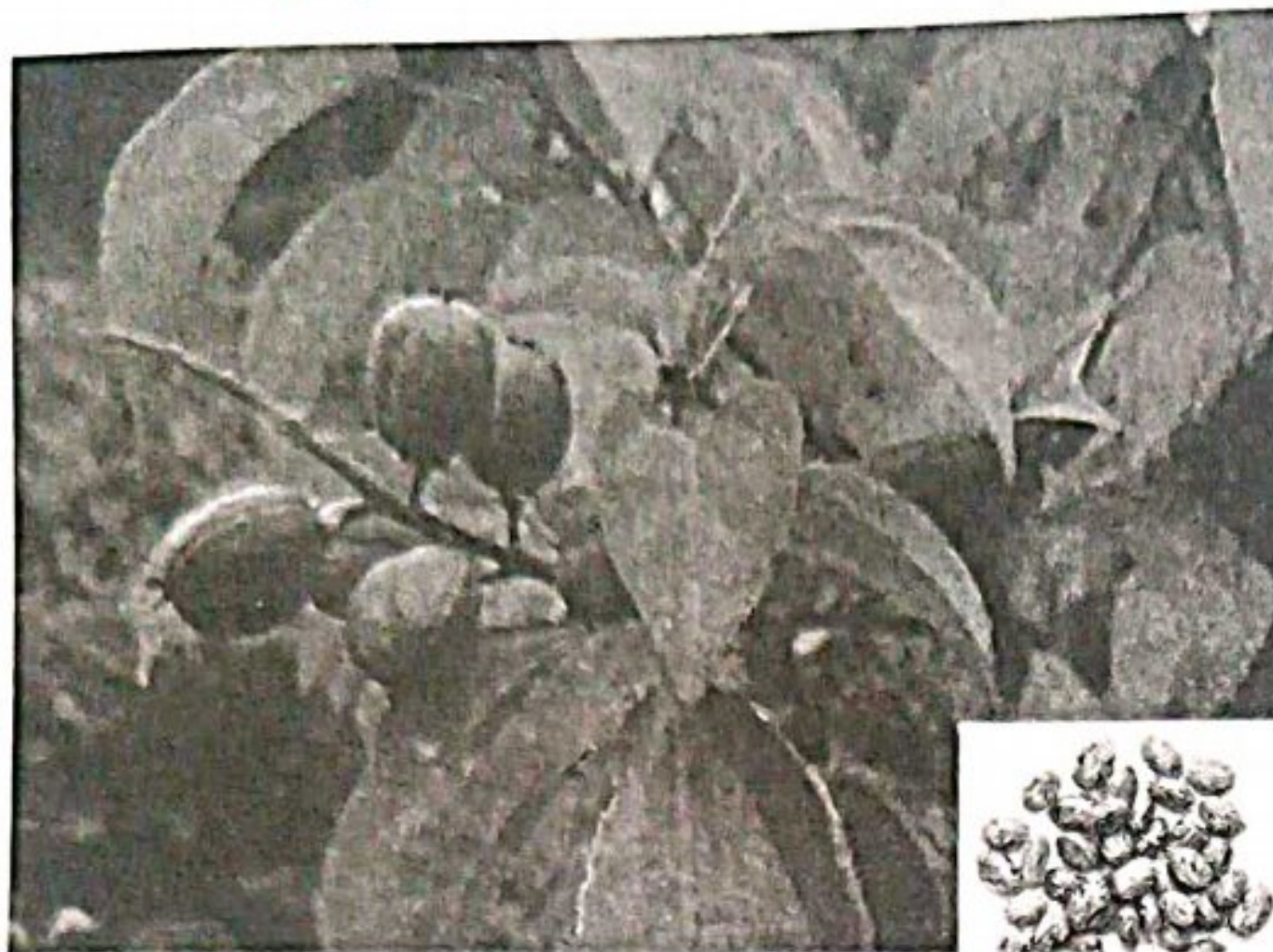
Therapeutic Dose- Bhanga leaf powder- 125-250 mg, Ganja 60-125 mg, Charasa 30mg in divided per day.

Formulations

- Pushpadhanwa Rasa
- Jatiphaladi Churna
- Nidroya Rasa
- Bahumutrantaka Rasa
- Maha Jwarankusha Rasa

Irritant Poisons - Jayapala, Gunja, Bhallataka, Arka, Snuhi, Langali

Learning objectives- Describe the active principles, mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of jayapala. Mention therapeutic dose and enlist two important formulations of jayapala. Describe the active principles, mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of gunja. Mention therapeutic dose and enlist two important formulations of gunja. Describe the active principles, mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of bhallataka. Mention therapeutic dose and enlist two important formulations of bhallataka. Describe the active principles, mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of arka and snuhi. Describe the active principles, mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance and medicolegal aspects of langali.

Jayapala (Croton Tiglium)

Botanical name : Croton tiglium

Family : Euphorbiaceae

Kula (family)- Eranda Kula

Type of poison- Irritant poison

Synonyms- Rechaka, Beeja Rechaka, Dantibeeja, Maladravi, Nikumba, Beejarechaka, Kumhibeeja, Sheegra, Hastidanti, Upachithrika, Chithramoola, Udumbarachada

Toxic Parts : Seed, Stem, Leaves

Toxic Principles : Crotin, Crotonoside, Crotonoleic acid, Crotonol

Mechanism of Action- The toxalbumin present in the seeds is a toxic protein that disables ribosomes and thereby inhibits protein synthesis.

Fatal dose: seeds, 20 drops oil in adult, 1 seed or 3 drops oils in children.

Fatal period: 4 - 6 hours

Signs and symptoms

- Pain in abdomen
- Salivation
- Vomiting
- Diarrhoea
- Vertigo
- Circulatory failure
- Shock

Management

1. Gastric lavage
2. Symptomatic treatment

Post-mortem appearance

1. Signs of inflammation in GIT
2. Abdominal viscera congested

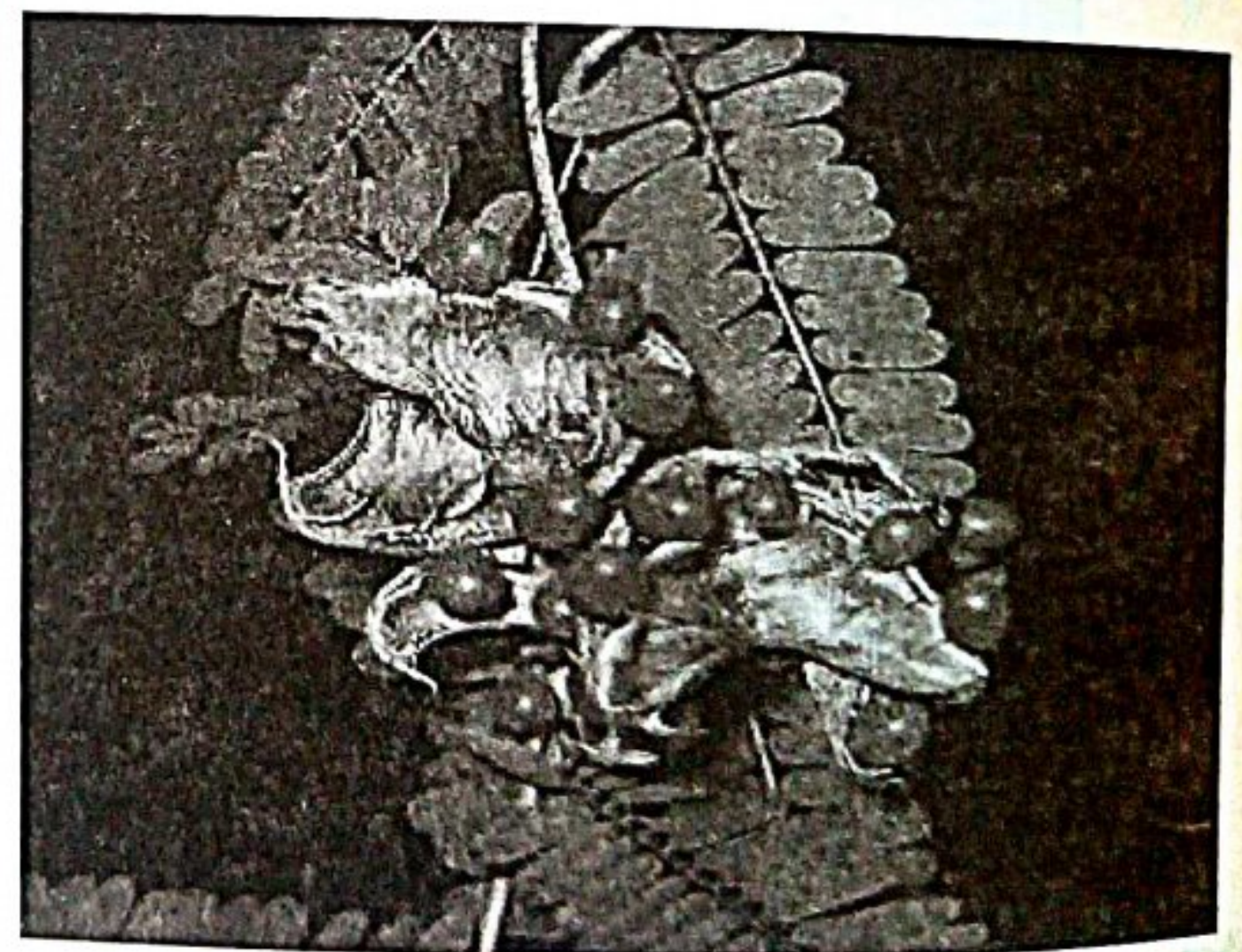
Medicolegal aspects

1. Accidental poisoning
2. Used to procure abortion
3. Seeds may be used for homicidal purpose
4. Used in quack medicine.
5. Arrow poison

Therapeutic Dose - Seed- 25 to 50 mg, seed oil 1-2 drop.

Formulations

- Ashvakanchuki Rasa
- Anjanabhairava Rasa
- Icchabhedi Rasa
- Jalodarari Rasa
- Jvarari Rasa

Gunja

Botanical name : Abrus precatorius

Family : Fabaceae/leguminose

Kula (family)- Shimbi Kula

Type of poison- Irritant poison

Synonyms- Chudamani, Kakanatika, Kakas-ahvaya, Bhilibhushani, Shikhandika, Sheetapaki, Ghughanta Rati, Krushnala, Durmoha, Raktika, Bahuvirya, Vanavasini, Kakachincha

Toxic Parts : Seed, root, leaves.

Toxic Principles : Abrin (similar to Viper snake venom) Chewing or crushing of seed releases abrin.

Mechanism of Action

Fatal dose: 1 to 2 crushed seeds, 90-120 mg of abrin

Fatal period: 3 to 5 days

Signs and symptoms- Painful swelling and ecchymosis, necrosis, nausea and vomiting, abdominal pain and diarrhoea

Management

- HCL+Pepsin
- Sodium bicarbonate for maintenance of alkalization of urine
- Use of antidote
- Symptomatic treatment.

Post-mortem appearance

- Local- oedema, inflammation, local necrosis and ecchymoses in skin.
- GIT-shows oedematous bowel with haemorrhage.
- Cerebral oedema
- Liver, spleen, kidneys congested

Medicolegal aspects

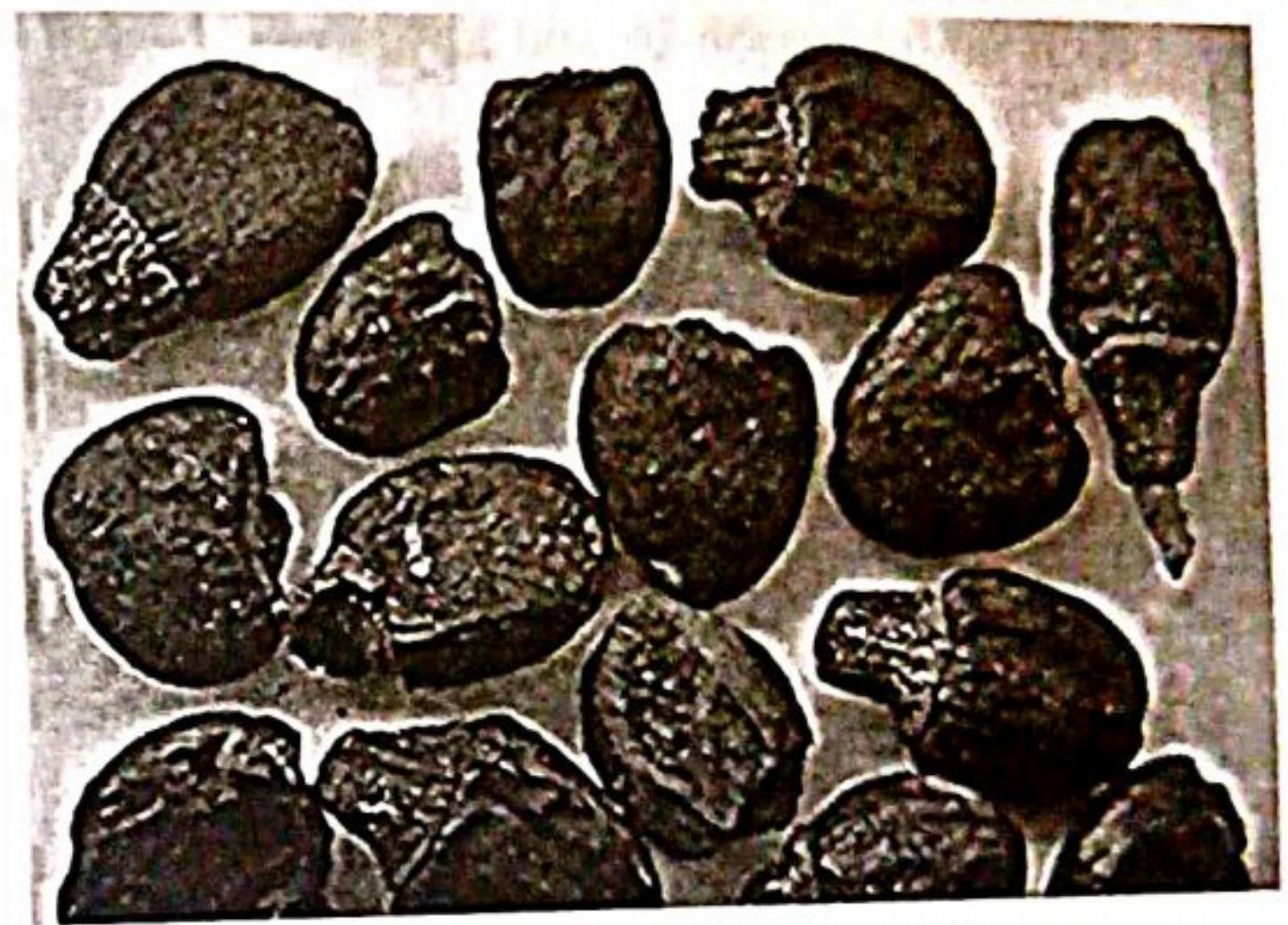
- Accidental poisoning may occur in children while exploring the seeds.
- Homicide by needle prepared with abrin.
- Cattle poison.
- Malingerers use powder of abrus seed to produce conjunctivitis.
- When intact seeds are swallowed or when seeds are boiled or cooked, they are not poisonous.

Therapeutic Dose - used as externally

Formulations

- Neelibhrungadi Taila
- Sarivadi Vati
- Gunja Taila

Bhallataka (Semecarpus Anacardium)



Botanical name: Semecarpus anacardium

Family: Anacardaceae

Kula (family)- Amra Kula

Type of poison- Irritant poison

Synonyms- Bilava, Tapana, Dahana, Vranakruta, Arushkara, Shophakruta, Dhanurbija, Tailabija, Bhali, Bhedana, Ranjaka, marking nut

Toxic Parts : Nut

Toxic Principles : Semecarpol, Bhilawanol, bioflavonoids, anacardic acid

Mechanism of Action

Fatal dose: 5 to 8 seeds, 10 gm of marking nut

Fatal period: 12 to 24 hours

Signs and symptoms-

1. Dermal exposure :

- a. Irritation, inflammation, vesication formation, pain and itching.
- b. Blister formation, ulcer with sloughing of skin.
2. Ingestion: blister in oral cavity, vomiting, diarrhoea, abdominal pain, hypotension, shock, delirium, Coma.

Management

1. Gastric lavage with Activated charcoal
2. Milk
3. Supportive measures

Post-mortem appearance

1. Blister formation in and around oral cavity and throat
2. GIT inflammation
3. Fatty degeneration of liver has been reported

Medicolegal aspects

1. Accidental poisoning quack medicine
2. Juice is applied to external genitalia of female as punishment for infidelity
3. Used to fabricate bruise or wound
4. Juice is thrown over other person to cause harm/injury
5. Juice is applied to cervical OS to procure criminal abortion
6. Skin lesion produced by marking nut may be confused with contusion.

Therapeutic Dose - Taila 10-20 drops, Kshirapaka- 30 ml

Formulations

- Amrita Bhallataka Ghrita
- Sanjivani Vati
- De Pile tablet

Arka

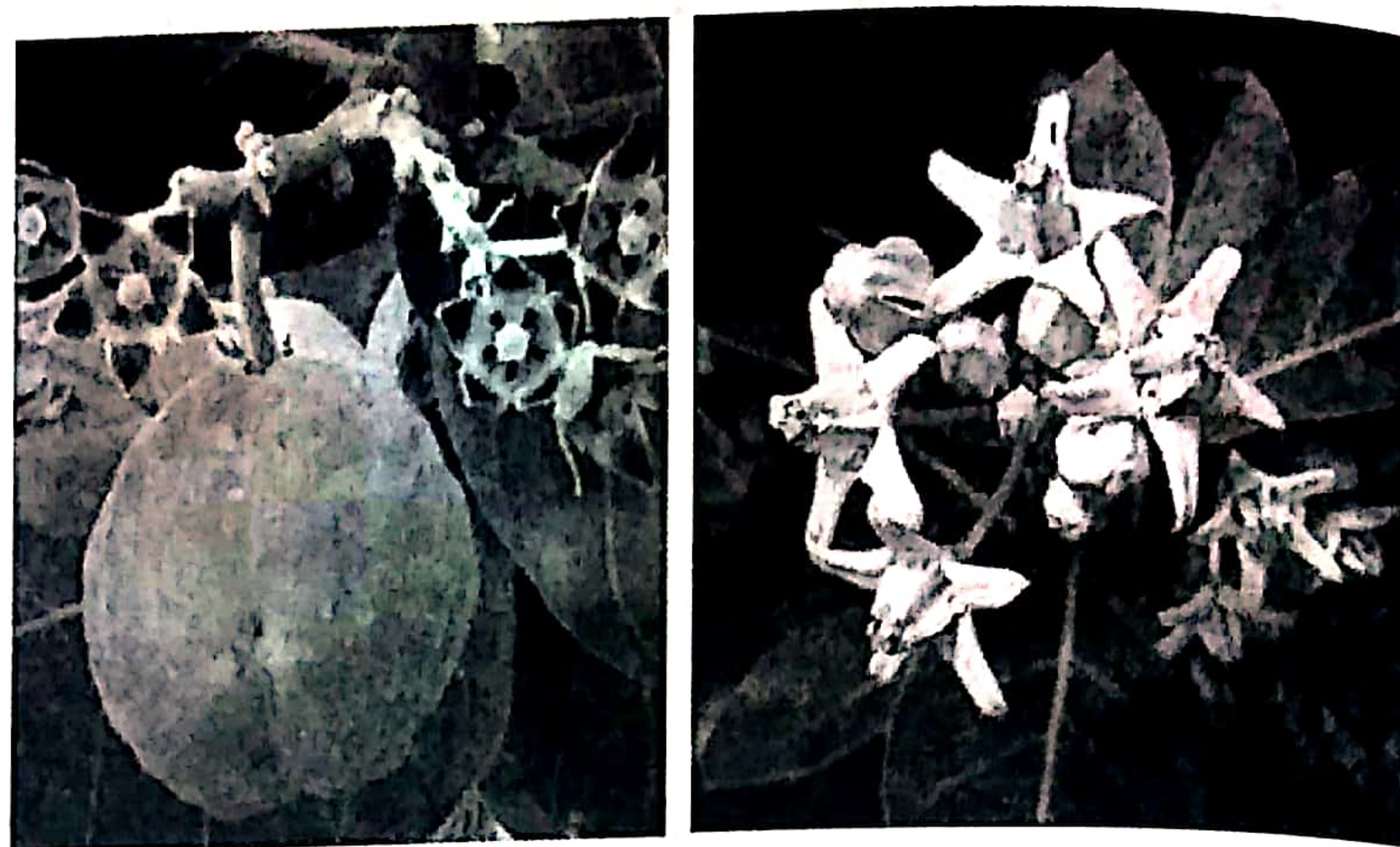
Botanical name : Calotropis gigantea, Calotropis procera

Family : Apocynaceae/Asclepiadaceae

Kula (family) Arka Kula

Type of poison Irritant poison

Synonyms- Toolaphala, Ksheeraparna,



Arkaparna, Vikirana, Asphota, Pratapa, Kharukhna, Kshirakandaka, Raktapushpa, Alarka, Mandara, Sapushpa, Talaphala

Toxic Parts leaves, Stem, Roots stem (Latex) and root are more poisonous.

Toxic Principles Calotropin, Calatoxin, Uscharin, Calactin

Mechanism of Action Carde

Fatal dose: Not fix (latex above 500mg)

Fatal period: 30 minutes- 8 hours

Signs and symptoms Diarrhoea, vomiting, skin allergic, latex go to eye cause blindness to opacity of cornea, excessive salivation, stomatitis, pupil dilation, tetanic convulsion, delirium

Management

External

- Chichapatra Kalka application
- Sunlight

Internal

- Goghrita a s antidote
- Gairika Siddha Jala
- Palasha as antidote

Others

- Gastric lavage followed with demulcents drink
- Activated charcoal
- Morphine like drug for pain relieve
- Inj. Diazepam or lorazepam or Inj. Epsoline 8 Hourly for convulsion
- Maintain vital status
- Wash affected area with water in dermal explosive

Post-mortem appearance

- Sign of irritation in stomach and intestine
- Discharge of blood from nostrils and mouth, frothy mouth, stomatitis
- Liver, spleen, intestine and kidney found congested.
- Empty heart
- Brain and its membranes found congested

Medicolegal aspects

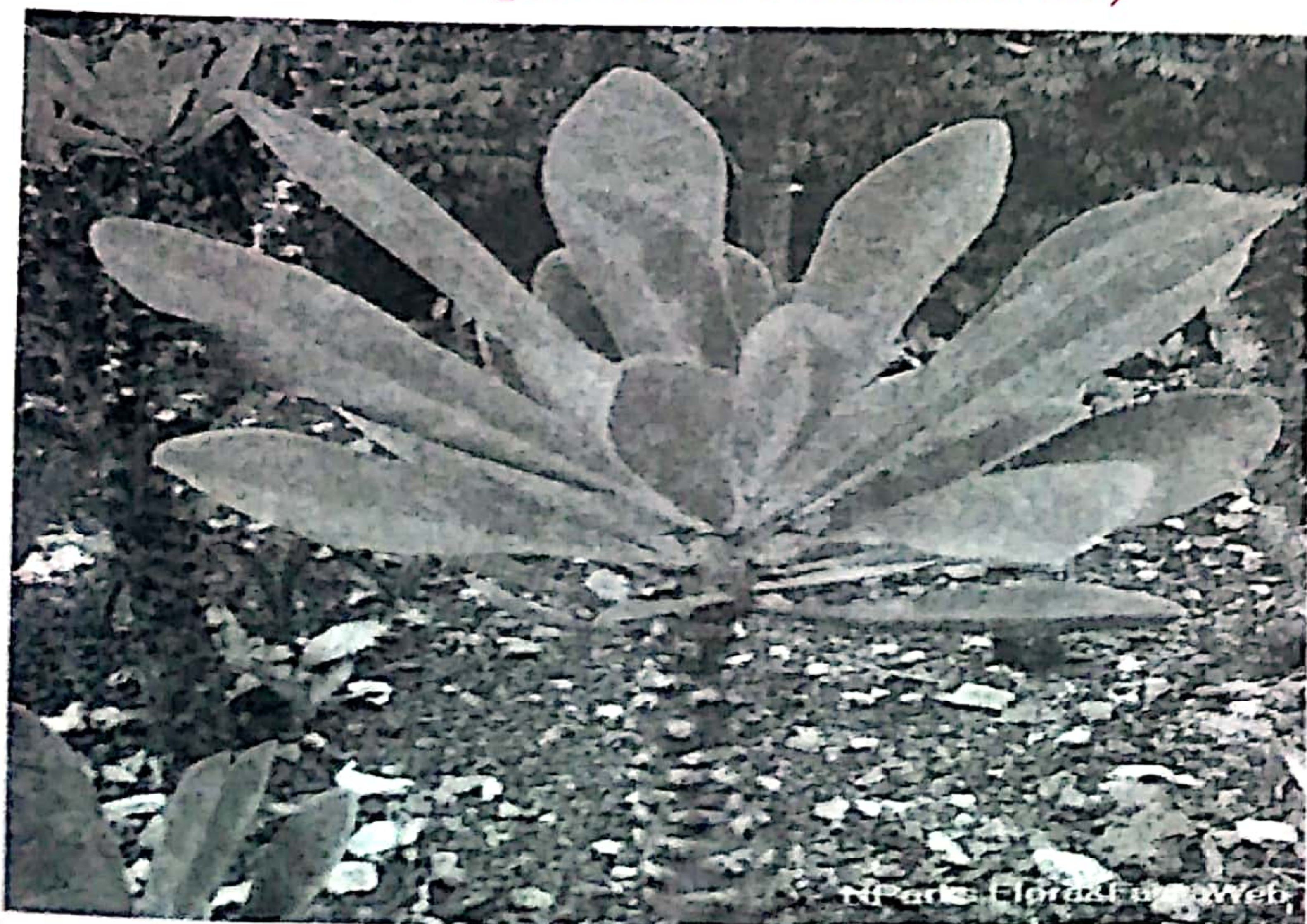
1. In criminal abortion- either administered orally or introduced in to uterus on an abortion stick.
2. Infanticide
3. Homicide
4. Accidental poisoning
5. Used as cattle poison
6. In artificial wound formation

Therapeutic Dose - Root bark powder - 0.5 - 1gm, flower powder- 1-2 gm

Formulations

- Ardraka Ghrita
- Arkadi Kashaya
- Asanadi Kashaya
- Arka Lavana
- Arkadi Churna
- Sootakabharana Rasa
- Ekangavira Rasa
- Mahavata Vidhwasa Rasa

Snuhi (Euphorbia Nerifolia L.)



Botanical name : Euphorbia nerifolia L.

Family : Euphorbiaceae

Types : Euphorbia antiquorum, E. nerifolia, E. tricalli

Kula (family)-Eranda Kula

Type of poison- Irritant poison

Synonyms- Sudha, Samantha Dugdha, Vajradruma, Nistrisha Patra, Mahavriksha, Vatari, Ksheerakanda, Bahushaka, Dandavruksha

Toxic Parts : Latex of stem and leaves.

Toxic Principles : Euphorbol, Euphol, Tulipanin

Mechanism of Action- Irritant organic vegetative poison

Fatal dose: 25-30 ml

Fatal period: 3 days

Signs and symptoms- Skin burning sensation, Swelling, expose to eye causes burning sensation, swelling, vomiting, diarrhoea, unconsciousness.

Management

External- Chinchapatra Lepa

Internal- Gairika Siddha Jala and antidote- milk, ghee

Others

- Wash contact part with running water
- On ingestion: gastric lavage with normal saline, use activate charcoal.
- Topical corticosteroid in skin irritation.
- Antibiotic eyedrop when enter into eye.

Post-mortem appearance

- Sign of inflammation of contact part
- Gangrenous patches in stomach
- Rotten spleen

Medicolegal aspects

- In Criminal abortion
- Accidental poisoning
- Homicidal & Suicidal purpose

Therapeutic Dose - root powder- 0.5 - 1 gm, stem juice- 5 -10 ml and Milky latex- 125-250mg.

Formulations

- Snuhi Kshara
- Agnivrana Taila
- Jalodarari Rasa
- Ayaskriti
- Vishatinduka Taila
- Abhaya Lavana
- Madhusnuhi Rasayana

Langali

Botanical name : Gloriosa superba

Family : Liliaceae

Kula (family)-Rasona Kula

Type of poison- Irritant poison

Synonyms- Agnishika, Raktapushpa, Garbhapatini, Halini, Shukrapuspi, Indrapushpi,

Kalihari, Siri, Vishalya, Kalikari.

Toxic Parts : Rhizome, tuber

Toxic Principles : Cholchicine, puteolin, colchicamide

Mechanism of Action

Fatal dose: 3-6 gm as abortifacient, Powder- 2- 5 gm, colchicine- 7-60 mg

Fatal period: 12-72 hours

Signs and symptoms- Vomiting, diarrhoea, pain in abdomen, chest pain, delirium, difficult in breathing, heat attack and death.

Management-common treatment, and systematic treatment

Post-mortem appearance-not specific

Medicolegal aspects

- Accidental poisoning may occur when the tuber of G. Superba is mistaken for sweet potato.
- Used as abortifacient
- Used as suicided

Therapeutic Dose - 250-500mg

Formulations

- Kalakuta Rasa
- Brihat Marichadi Taila
- Chitrakadi Taila
- Munipile oil

Syllabus

1. Arsenic
2. Mercury
3. Lead Poisoning
4. Copper Poisoning

Learning objectives

1. Describe the mode of action, fatal dose, fatal period, signs and symptoms, management, post-mortem appearance, medicolegal aspects of acute poisoning of : 1. Arsenic 2. Mercury 3. Lead 4. Copper
2. Write its therapeutic dose and enlist any four important formulations.
3. Discuss the Ayurvedic concepts for the diagnosis and management of chronic heavy metal toxicity.
4. Discuss the toxicological implications of improperly prepared medicines with special reference to those containing metals, minerals and poisonous substances.

Total - 6 hours (Lecture :04 hour, Non-lecture: 02 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- Yes

Arsenic Poisoning

Properties

- Arsenic is a metalloid and not very toxic, however, arsenic salts are toxic.
- Organic compounds of arsenic are : Cacodylic acid, Sodium cacodylate, Atoxyl, Stovarsol

Uses : Rodenticide, weed killer, in alloys, depletory and colouring agent

Sources : Rocks and soil, hot spring mineral water, drinking water, sea water, vegetable, fruits and grains, sea food, industrial sources

Absorption, metabolism and excretion

- Absorption - through skin, inhalation, and GIT mucosa, cutaneous absorption
- Metabolism - liver, kidney
- Excretion - urine

Mechanism of Action

- Arsenic blocks Krebs cycle and interrupts oxidative phosphorylation causing depletion

of ATP and death of cell. It also inhibits transformation of thiamine into acetyl CoA and Succinyl-CoA resulting in thiamine deficiency.

- It replaces the phosphorus in the bones.
- Arsenic is incorporated into hair, nails and skin.
- It causes increased permeability of small blood vessels with inflammation and necrosis of intestinal mucosa thus causing manifestation of hemorrhagic gastroenteritis.

Signs and symptoms



(Palmoplantar hyperkeratosis)

1. Gastroenteritis, nausea, vomiting, colicky abdominal pain, profuse diarrhoea, watery stool like cholera, intense thirst.
2. Pigment changes and palmoplantar hyperkeratoses.
3. Uraemia
4. Tachycardia
5. Vertigo, tremors, convulsion
6. Collapse and circulatory failure

Treatment

1. Stomach wash
2. Antidote : Freshly precipitated hydrated ferric oxide.

Postmortem appearance

1. Red velvety mucosa of stomach and submucous petechial haemorrhage.
2. Fatty degeneration of liver, kidney and heart
3. Arsenic retard putrefaction in bones, hair and nails

Mercury poisoning

- Mercury is a naturally occurring element that is found in air, water and soil.
- Exposure to mercury – even small amounts – may cause serious health problems, and is a threat to the development of the child in utero and early in life.
- Mercury may have toxic effects on the nervous, digestive and immune systems, and on lungs, kidneys, skin and eyes.

Sources

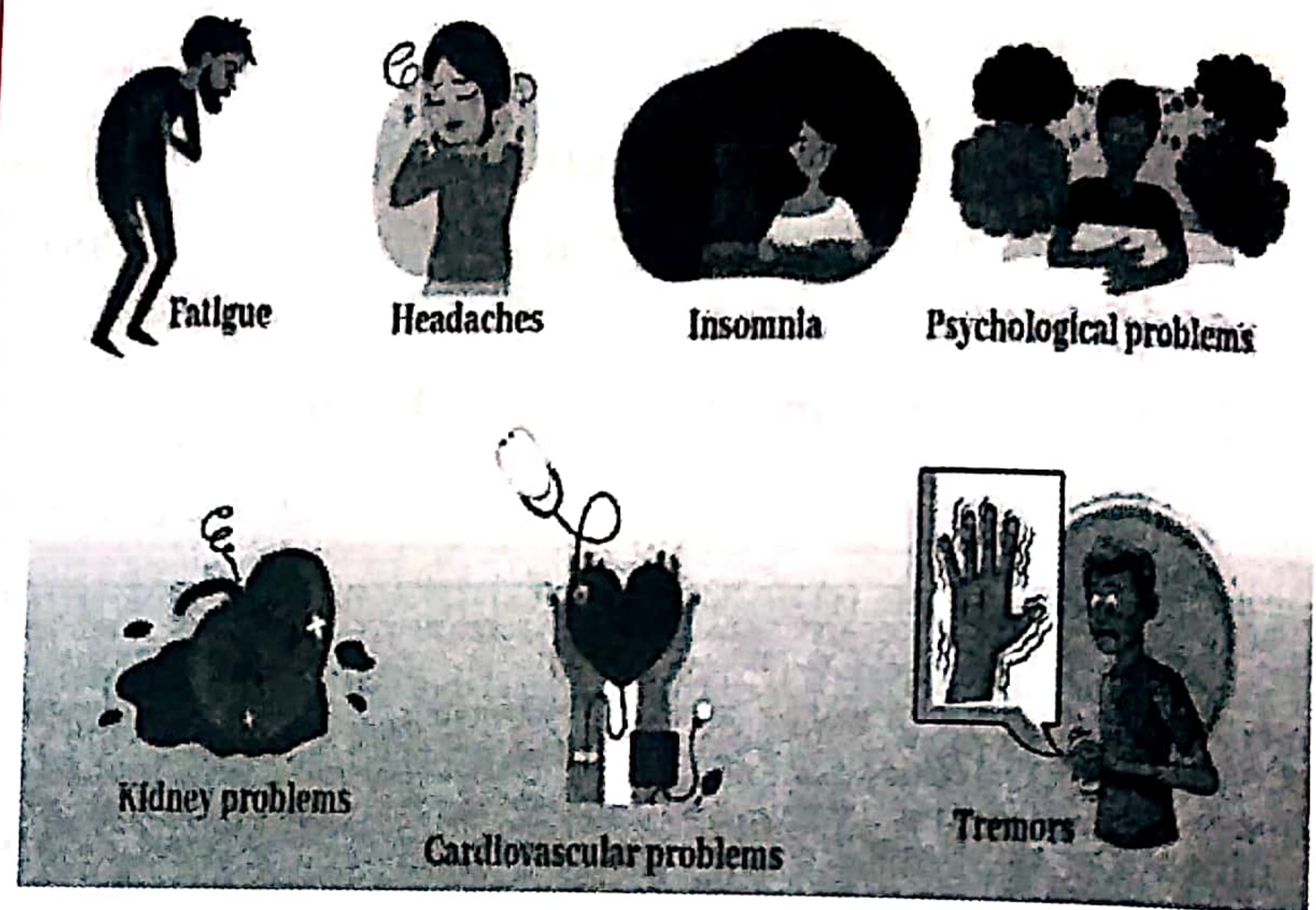
People may be exposed to mercury in any of its forms under different circumstances. However, exposure mainly occurs through consumption of fish and shellfish contaminated with methylmercury and through worker inhalation of elemental mercury vapours during industrial processes. Cooking does not eliminate mercury.

Mercury is contained in many products, including:

- Batteries

- Measuring devices, such as thermometers and barometers
- Electric switches and relays in equipment
- Lamps (including some types of light bulbs)
- Dental amalgam (for dental fillings)
- Skin-lightening products and other cosmetics
- Pharmaceuticals.

Symptoms



(Hg poisoning)

1. Metallic taste in mouth
2. Burning pain in mouth and stomach
3. Tongue and throat are corroded with grey white coating
4. Nausea and vomiting
5. Stools may be bloody dark in colour
6. Headache, convulsions, numbness, tremor.

Sign

1. Peripheral neuropathy- paraesthesia or itching, burning, pain, or even a sensation that resembles small insects crawling on or under the skin (formication)
2. Skin discoloration (pink cheeks, fingertips and toes)
3. Swelling and desquamation (shedding or peeling of skin).
4. Affected children may show red cheeks, nose and lips, loss of hair, teeth, and nails, transient rashes, hypotonia (muscle weakness), and increased sensitivity to light.

Diagnosis

- History of exposure,
- Physical findings, and
- Blood test: an elevated level of mercury.

Treatment

1. Decontamination: removal of clothes, washing skin with soap and water, and flushing the eyes with saline solution
2. Chelating agent: DMSA, DMPS, BAL, D-penicillamine

Lead poisoning

Lead is a naturally occurring toxic metal found in the Earth's crust. Its widespread use has resulted in extensive environmental contamination, human exposure and cause significant public health problems.

Health hazards

- a) Young children are more vulnerable to the toxic effects of lead and can suffer profound and permanent adverse health impacts, particularly on the development of the brain and nervous system resulting in reduced intelligence quotient (IQ), behavioural changes such as reduced attention span and increased antisocial behaviour, and reduced educational attainment.
- b) Lead also causes long-term harm in adults, including increased risk of high blood pressure, cardiovascular problems and kidney damage. Exposure of pregnant women to high levels of lead can cause miscarriage, stillbirth, premature birth and low birth weight.

Sources of environmental contamination:

1. Mining, smelting, manufacturing and recycling activities and use in a wide range of products.
2. More lead consumption is for the manufacture of lead-acid batteries for motor vehicles.
3. It is also used in many other products, for example pigments, paints, solder, stained glass, lead crystal glassware, ammunition,

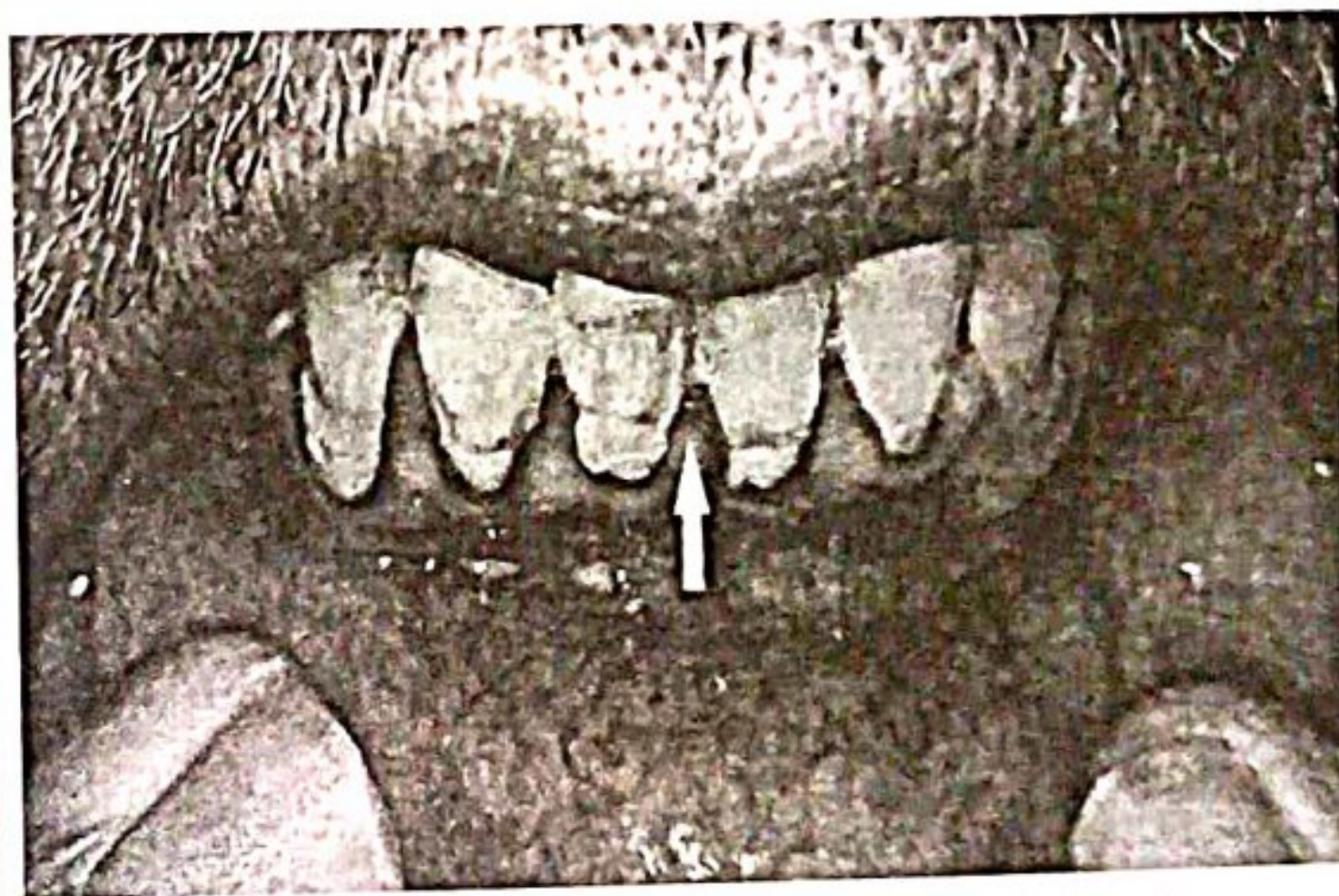
ceramic glazes, jewellery, toys, some traditional cosmetics such as sindoor, and traditional medicines.

4. Drinking water delivered through lead pipes or pipes joined with lead solder may contain lead.

Symptoms

Common sign & symptoms of Lead poisoning:

1. Metallic taste in mouth
2. Nausea & abdominal pain
3. Vomiting
4. Stool may be bloody dark in colour
5. Headache, drowsiness, cramps, convulsions, numbness
6. In chronic poisoning- a blue line is seen in gum (Blue line gum)

**Lead poisoning symptoms in children**

- Developmental delay
- Learning difficulties
- Irritability
- Loss of appetite
- Weight loss
- Sluggishness and fatigue
- Abdominal pain
- Vomiting
- Constipation
- Hearing loss
- Seizures
- Eating things, such as paint chips

Lead poisoning

Babies exposed to lead before birth might:

Symptoms in newborns

- Be born prematurely
- Have lower birth weight
- Have slowed growth

Lead poisoning**Symptoms in adults**

- High blood pressure
- Joint and muscle pain
- Difficulties with memory or concentration
- Headache
- Abdominal pain
- Mood disorders
- Reduced sperm count and abnormal sperm
- Miscarriage, stillbirth or premature birth in pregnant women

Diagnosis

- Blood test to check the level of lead
- Metallic taste

Treatment

1. Remove the source of the contamination
2. Give plenty of warm water
3. Milk, white of egg, barley water can be given
4. Induce vomiting
5. Chelating agent: EDTA
6. Antidote: 2,3-Dimercaptosuccinic acid (DMSA)

Copper

Pure copper is not poisonous but their salts are poisonous.

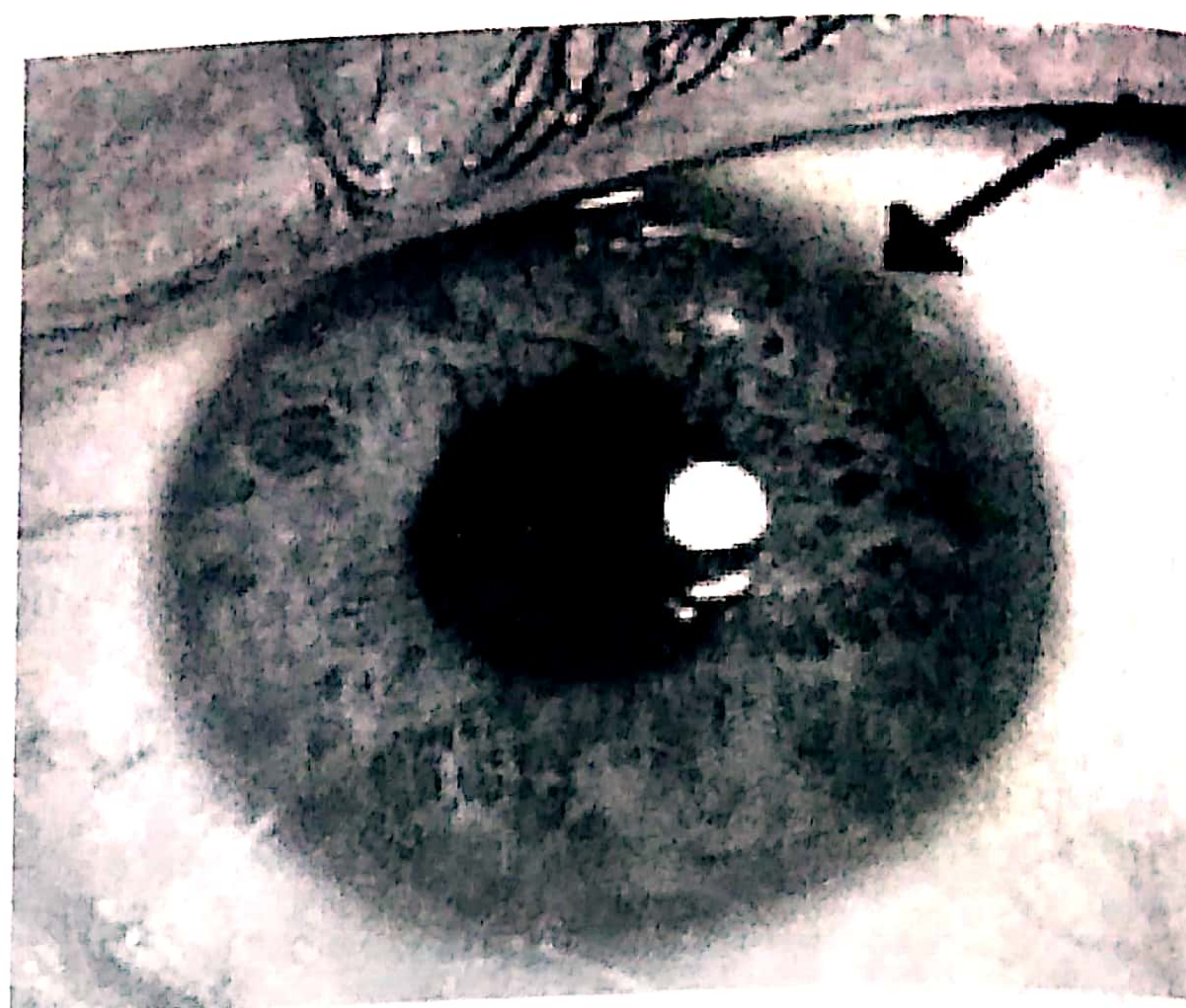
Uses : insecticide, fungicide, used in alloys and as pigments.

- Absorption - through skin, GIT, lungs and mucous membrane
- Excretion - through bile, saliva and milk.

Fatal Dose :

- Copper sulphate – 30 gm
- Copper subacetate – 15 gm

Fatal period: 1 to 3 days

**Signs and symptoms****Acute Poisoning**

1. Ingestion:
 - Metallic taste, increased salivation, colicky abdominal pain, diarrhoea, nausea and vomiting (Vomitus - bluish or greenish)
 - Myalgia
 - Methemoglobinemia, hemolysis, Jaundice
 - Oliguria and renal failure
 - Convulsions, delirium, coma.
2. Inhalation of Copper fumes or dust
 - Respiratory tract irritation
 - Cough
 - Conjunctivitis

Chronic Poisoning

1. Abdominal pain
2. Greenish line on dental margins of gum
3. Vineyard Sprayer's lung disease
4. Greenish hair discolouration
5. Wilson's disease

Treatment

1. Gastric lavage with potassium ferrocyanide.
2. Chelation therapy :

Initially with dimercaprol 2.5 mg/kg four hourly IM followed by oral penicillamine 2 g/day
3. Symptomatic treatment.

Postmortem appearance

1. Jaundice
2. Greenish-blue froth at mouth
3. Bluish line on gums
4. Greenish or bluish stomach contents and gastric mucosa
5. Hemolysis
6. Kidneys-tubular necrosis, edema of medulla and appearance of eosinophilic cast

7. Muscle atrophy

8. Liver – soft and fatty. Microscopy shows centrilobular necrosis.

Medicolegal importance

1. Suicidal poisoning – common.
2. Accidental poisoning may occur in children.
3. Chronic poisoning – industrial hazard.
4. Use to procure criminal abortion.
5. Cattle poison.

Syllabus

1. Sarpa visha

Learning objectives

1. Describe Sarpa Bheda and enumerate the identification features of Darvikara, Mandali and Rajimantha Sarpa.
2. Classify snakes and describe the features of venomous and non venomous snakes and identify their bites.
3. Describe the fatal dose, fatal period, signs and symptoms of common cobra, king cobra, russel's viper, saw scaled viper, pit vipers and common krait.
4. Describe the Samanya Lakshana and Samanya Chikitsa of Darvikara, Mandali and Rajimanth Sarpa Damsha.
5. Describe the management of snake bites according to recent WHO snake bite management guidelines.

Total - 16 hours (Lecture :10 hour, Non-lecture: 06 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- Yes

Jangama Visha (Animal origin poisons)

सर्पाःकीटोन्दुरा लूता वृश्चिका गृहगोधिकाः ।
जलौकामत्स्यमण्डूकाः कणभाः कृकलासकाः ॥
श्वसिंहव्याघ्रगोमायुतरक्षुनकुलादयः ।
दंष्ट्रिणो ये विषं तेषां दंष्ट्रोत्थं जङ्गमं मतम् ॥

(च.चि. 23/9-10)

Jangama Visha (animal origin poisons) are Sarpa (snakes), Kita (insects), Luta (spiders), Vrushchika (scorpions), Griha Godhika (house lizards), Jalauka (leeches), Matsya (fish), Manduka (frogs), Kanabha or Salabha (locusts), Krukantaka (chameleon), Shwa (dogs), Simha (lion), Vyaghra (tiger), Gomayu (jack), Taraksu (hyena), Nakula (mongoose) etc. are the fanged animals through whose fangs the poison is transmitted.

Jangama Visha Lakshana

निद्रां तन्द्रां क्लमं दाहं संपाकं लोमहर्षणम् ।

शोफं चैवातिसारं च जनयेज्जाङ्गमं विषम् ॥

(च.चि. 23/15)

Jangama Visha (poison of mobile origin or animal poison) produces following symptoms,

- Nidra - Excessive sleep,
- Tandra - Drowsiness,
- Klama - Mental fatigue,
- Daha - Burning sensation,
- Sapakam - Suppuration,
- Lomaharshanam - Excessive horripilation,
- Shopha - Inflammation,
- Atisara - Diarrhoea.

Sarpa Visha

Sarpa Bheda (types of snakes)

According Vagbhata Acharya

- दिव्य सर्प - Ananta, Takshaka, Vaasuki,

Gulika, Karkotaka, Shamkhapala, Padma, Mahapa-dma

- भौमिक सर्प – living on the earth- Darvikaara, mandali, Rajimana, Nirvish, Vyantara

According Charaka Acharya (दर्वीकर)

- मण्डली
- राजिमान

According Sushruta Acharya

Type	Number
Darvikara	26
Mandali	22
Rajimaha	10
Nirvisha	12
Vaikaranja and Vaikaranjaud-abhava	10
Total	80

The Bhaumya Sarpa (terrestrial snakes) are classified into five types. Darvikara (hooded), Mandali (hoodless and painted with circular paths or rings of varied colors on their skin), Rajimanta (hoodless and striped), Nirvisha (non-poisonous) and Vaikaranja (hybrid species). These five types of snakes are sub classified into eighty types.

Sarpa Bheda (types of snakes) and its effect on Dosha-

इह दर्वीकरः सर्पो मण्डली राजीमानिति ।
त्रयो यथाक्रमं वातपित्तश्लेष्मप्रकोपणाः ॥
(च.चि. 23/124)

Snakes are classified into three categories.

- Darvikara Sarpa - Aggravation of Vayu
- Mandali Sarpa - Aggravation of Pitta
- Rajimana Sarpa - Aggravation of Kapha.

According वर्णभेद types of सर्प

ब्राह्मण- मुक्तारूप्यप्रभा, कपिल, पत्रगा, सुगंधय, सुवर्णामारुते
क्षत्रिय - स्निग्धवर्णा, पत्रगा, भृशकोपना, सूर्यचंद्राकृति, छत्र-
लक्ष्य, पारावतामा

वैश्य - कृष्णा, वज्रनिभा, लोहिता, धूम्रा, पारावतामा

शुद्र - महिष, दीपिकावर्ग, परुष, भिन्नवर्णा

According to लिंग भेद

- Purusha
- Stri
- Napunsaka

Sarpa Parichaya (Identification of snakes)

दर्वीकरः फणी ज्ञेयो मण्डली मण्डलाफणः ।
बिन्दुलेखविचित्राङ्गः पन्नगः स्यात्तु राजिमान् ॥

(च.चि. 23/125)

- Darvikara Sarpa - Phani (hood).
- Mandali Sarpa- Aphana (hoodless) but Mandala (possess rounded marks on their body).
- Rajimana Sarpa - Bindu Lekha Vichitranga (possess variegated spots and streaks on its body).

दर्वीकर सर्प

रथाङ्गलाङ्गलच्छत्रस्वस्तिकाङ्कुशधारिणः ।
ज्ञेया दर्वीकराः सर्पाः फणिनः शीघ्रगामिनः ॥

(सु.क. 4/22)

Snakes which make a Phana (hood) having on it, marks resembling a Rathanga (wheel), Lagala (plough), Chatra (umbrella), Svastika (cross) and Ankusha (elephant's goad) and which move fast are to be known as Darvikara (hooded snake).

मण्डली सर्प

मण्डलैर्विविधैश्चित्राः पृथवो मन्दगामिनः ।
ज्ञेया मण्डलिनः सर्पा ज्वलनार्कसमप्रभाः ॥

(सु.क. 4/23)

Snakes which have patches of different kinds (shapes) on their body, which are big in size, which move slowly are known as Mandali (patched snake) and like fire and sun (in effect of their poison).

राजिमान सर्प

स्निग्धा विविधवर्णाभिस्तिर्यगूर्ध्वं च राजिभिः ।
चित्रिता इव ये भान्ति राजिमन्तस्तु ते स्मृताः ॥

(सु.क. 4/24)

Snakes which are Snigdha (unctuous-slimy), Vividha Varna (many colours), decorated with stripes above and sides of their body, should be known as Rajimanta (striped snakes).

वैकरञ्ज सर्प - Hybrid type mixed Darvikara, Mandal and Rajamani snake qualities

निर्विष सर्प - Non poisonous

सर्पदंश कारण (Reasons and kinds of bite)

पादाभिमृष्टा दुष्टा वा क्रुद्धा ग्रासार्थिनोऽपि वा ।
ते दशन्ति महाक्रोधास्त्रिविधं भीमदर्शनाः ॥
सर्पितं रदितं चापि तृतीयमथ निर्विषम् ।
सर्पाङ्गाभिहतं केचिदिच्छन्ति खलु तद्विदः ॥
(सु.क. 4/13)

Snakes when trampled by feet, those which are cruel (by nature), which are enraged (angry) which are in search of food and which are very angry, (ferocious) these bite others (men and animals); it (bite) is of three kinds, viz Sarpita, Radita and Nirvisha. Some authorities who have special knowledge wish to include Sarpangabhihata also as the fourth kind.

सर्पदंश प्रकार (According Sushruta Acharya)

Three types – सर्पित, रदित, निर्विष

Four types – सर्पित, रदित, निर्विष, सर्पाङ्गाभिहत

Sarpita Damsha Lakshana (deep poisonous bite)

पदानि यत्र दन्तानामेकं द्वे वा बहूनि वा ।
निमग्नान्यल्परक्तानि यान्युद्धृत्य करोति हि ॥
चञ्चुमालकयुक्तानि वैकृत्यकरणानि च ।
सङ्क्षिप्तानि सशोफानि विद्यात्तत् सर्पितं भिषक् ॥
(सु.क. 4/15-16)

When two or more marks of teeth are visible at the site of bite, which are deep and with little quantity of blood coming out, which when squeezed gives rise to development of sprout like eruptions and other abnormalities, which are minute and accompanied with swelling-these should be understood by the physician, as Sarpita (actual bite).

Radita Damsha Lakshana (Laccrated bite)

राज्यः सलोहिता यत्र नीलाः पीताः सितास्तथा ।
विज्ञेयं रदितं तत्तु ज्ञेयमल्पविषं च तत् ॥
(सु.क. 4/17)

Presence of lines which are bluish- red, yellow or white should be understood as Radita (laccration) and has less amount of poison.

Nirvisha Damsha Lakshana (poison free bite)

अशोफमल्पदुष्टासृक् प्रकृतिस्थस्य देहिनः ।
पदं पदानि वा विद्यादविषं तच्चिकित्सकः ॥
सर्पस्पृष्टस्य भीरोर्हि भयेन कुपितोऽनिलः ।
कस्यचित् कुरुते शोफं सर्पाङ्गाभिहतं तु तत् ॥
(सु.क. 4/18-19)

That which has no swelling, has little amount of vitiated blood, that bitten by a snake which is normal (not angry, not hungry etc) marks of one or many visible marks at the site of bite, should be understood by the physician as Nirvisha (not having poison).

In persons who are afraid, when touched by the snake (any part of its body) Vata becomes aggravated by fear and gives rise to swelling (at the place of contact) in some persons. This is known as Sarpangabhihata (hurt by the body of the snake).

सर्पदंश प्रकार According Charaka Acharya

Five types - गूढसंपादित, वृत्त, पीडित, लम्बित, सर्पित

Five types - तुण्डाहत, व्यालीढ़, व्यालुप्त, दंष्टक, द्रंष्ट्रनिपिडित

Sarpa Visha Viseshshata (properties of snake poisons)

विशेषाद्रूक्षकटुकमम्लोष्णं स्वादु शीतलम् ।
विषं यथाक्रमं तेषां तस्माद्वातादिकोपनम् ॥
(च.चि. 23/126)

- Darvikara Sarpa Visha - Ruksha (un-unctuous) and Kathu (pungent) and due to this it vitiates the Vata Dosha.
- Mandali Sarpa Visha – Amla (sour) and Ushna (hot) due to which it aggravates Pitta.
- Rajimana Sarpa – Madhura (sweet) and Shita (cold) due to which it aggravates Kapha.

Sarpa Visha Samanya Lakshana

विषं हि निशितनिधिंशाशनिहुतवहदेश्यमाशुकारि
मुहूर्तमप्युपेक्षितमातुरमतिपातयति.....। (सु.क. 4/36)

Poison is similar to a sharpened sword, lightning and fire in effect and kills the person even if neglected for a muhurta (few minutes); there will be no time even to have a talk (to enquire details of kind of snake etc); though bite of each kind of snake is different yet it is of three types generally.

Sarpadamsha Vishishta Lakshana

Darvikara Sarpa Damshttra (Characteristics of Darvikara snake bite)

दर्वीकरकृतो दंशः सूक्ष्मदंष्ट्रापदोऽसितः ।
निरुद्धरक्तः कूर्माभो वातव्याधिकरो मतः ॥
(च.चि. 23/127)

The bite by the Darvikara Sarpa is characterized by,

- Sukshma Samshttra - Minute fang marks,
- Krishna Varna - Black,
- Niruddha Rakta - Absence of bleeding,
- Kurmabho - Swelling having the shape of back of a Kurma (tortoise)
- Vata Vyadhikara- It produces several disorders due to aggravation of Vata.

तत्र, दर्वीकरविषेण त्वङ्मननखदशनवदनमूत्रपुरीष-
दंशकृष्णत्वं रौक्ष्यं शिरसो गौरवं सन्धिवेदना कटीपृष्ठग्रीवादौर्बल्यं
जृम्भणं वेपथुः स्वरावसादो घुर्घुरको जडता शुष्कोद्गारः
कासश्वासौ हिक्का वायोरूर्ध्वगमनं शूलोद्वेष्टनं तृष्णा लालास्रावः
फेनागमनं स्रोतोऽवरोधस्तास्ताश्च वातवेदना भवन्ति ।

(सु.क. 4/37)

Darvikara Visha Sarpa with hood, there will be black colour of the kin, eyes, teeth, face, urine, faeces and the site of bite, dryness, feeling of heaviness of the head, pain in the joints, debility of the waist, back and neck, more of yawning, shivering, feeble voice, rough sound in the throat, lassitude, belching, cough, dyspnoea, hiccup, upward movement of gas, twisting pain the abdomen, thirst, more salivation, appearance of froth in the mouth, block age channels and such other symptoms of Vata aggravation will be present.

Mandali Sarpa Damshttra (Characteristics of Mandali snake bite)

पृथ्वर्पितः सशोथश्च दंशो मण्डलिना कृतः ।
पीताभः पीतरक्तश्च सर्वपित्तविकारकृत् ॥
(च.चि. 23/128)

The bite by the Mandali Sarpa is characterized by :

- Pruthvarpita Sashotha - Fang marks due to the bite by Mandali Sarpa is deep, the wound is spread over a large surface area, associated with edema. (पृथ्वर्पित इति अवगाढदंष्ट्रापदः- Deep bite, mark observed.)
- Pita - Yellowish discoloration at the site of bite.
- Pitarakta - Exudates at the bite site are yellowish and bloody.
- Sarpa Pitta Vikaranuta - They cause several other disorders due to aggravation of Pitta.

मण्डलिविषेण त्वगादीनां पीतत्वं शीताभिलाषः परिधूपनं
दाहस्तृष्णा मदो मूर्च्छा ज्वरःशोणितागमनमूर्ध्वमधश्च
मांसानामवशातनं श्वयथुर्दशकोथः पीतरूपदर्शनमाशुकोप-
स्तास्ताश्च पित्तवेदना भवन्ति । (सु.क. 4/37)

Mandali Visha Sarpa with patches, there will be yellow colour of skin etc. desire for cold, burning sensation-local and general, thirst, intoxication, fainting, fever, bleeding from upper and lower orifices, falling off of muscles. swelling and putrefaction of the site of bite, the person sees all things yellow. becomes angry quickly, and other symptoms of aggravation of pitta will be found.

Rajimana Srpa Damshttra (Characteristics of Rajimana snake bite)

कृतो राजिमता दंशः पिच्छिलः स्थिरशोफकृत् ।
स्निग्धः पाण्डुश्च सान्द्रासृक् श्लेष्मव्याधिसमीरणः ॥
(च.चि. 23/129)

The bite by the Rajimana Srpa is characterized by :

- Picchila Sthira Shopha- Soft and stable edema.

- Snigdha Pandu - Bite site is unctuous and pale.
- Sandra Asruka - The bloody exudates coming from the bite site is thick.
- Shleshma Vaydhi Samirana - Several disorders due to aggravation of Kapha.

राजिमद्विषेण शुक्लत्वं त्वगादीनां शीतज्वरो रोमहर्षः
स्तब्धत्वं गात्राणामादंशशोफः सान्द्रकफप्रसेकश्छर्दिभीक्षण-
मक्ष्णोः कण्डूः कण्ठे श्वयथुर्घुर्घुरक उच्छ्वासनिरोधस्तमः-

प्रवेशस्तास्ताश्च कफवेदना भवन्ति । (सु.क. 4/37)

Rajimana Sarpa Visha with stripes, there will be white colour of the skin etc, fever with chills, horripilation, rigidity of the body, swelling of the site of bite, elimination of thick Kapha (saliva and froth) from the mouth, continuous vomiting, irritation of the eyes, swelling, husky voice in the throat, obstruction of expiration, darkness before the eyes and others symptoms of aggravation of Kapha, will be found.

Particular	Darvikara	Mandala	Rajimanta
Dosha	Vatakara	Pittakara	Kaphakara
Phana	Phanayukta	Aphana	Bindulekha Vichita
Guna	Ruksha, Katu	Amala, Ushna	Madhura, Shita
Lakshana	Sukshma, Krisha Varna, Niruddha Rakta, Kurmabhi, Vata Vyadhikara	Prutharpita, Shotha, Pita, Pitarakta, Pitta Vikara Kruta	Picchila, Sthira Shopha, Snigdha, Pandu, Sandra Asruka, Kapha Vikara.
Visha Prabhava	Taruna Vaya (younger)	Sthavira (old)	Madhyama (middle)

Purusha, Stri and Kliba Sarpa (Gender wise characteristics of snakes)

वृत्तभोगो महाकायः श्वसन्नूर्ध्वेक्षणः पुमान् ।
स्थूलमूर्धा समाङ्गश्च स्त्री त्वतः स्याद्विपर्ययात् ॥
क्लीबस्त्रसत्यधोदृष्टिः स्वरहीनः प्रकम्पते ।

(च.चि. 23/130)

The snake which is Vrutta (round coiled) has a Mahakaya (large body), that Shwasana (hisses loudly), that which Urdhwakshana (looks upward), has a Sthula Murdha (large head) and an even body is a male. The ones with Viparyaya (opposite characteristics) is a female. The Napumsaka (impotent) snake is fearful in nature.

Sr. No.	Stri Bheda	Purusha Bheda
1.	No round coiled	Vrutta Bhoga
2.	Alpa Kaya	Maha Kaya
3.	Less Shwasana	Shwasna more
4.	Not elevated	Urdhwaga

5.	Mrudu Chikitsa	Tivra Chikitsa
6.	Superficial bite	Deep bite
6.	Lakshana- Person looks downward feeble voice trembles	-

Damshtra Lakshana (Differentiation in features in snake bite of different genders)

स्त्रिया दष्टो विपर्यस्तैरेतैः पुंसा नरो मतः ॥
व्यामिश्रलिङ्गैरेतैस्तु क्लीबदष्टं नरं वदेत् ।
इत्येतदुक्तं सर्पाणां स्त्रीपुंक्लीबनिर्दर्शनम् ॥

(च.चि. 23/131-132)

The patient bitten by a female snake looks downwards, has feeble voice and trembles. In a patient bitten by a male snake, the features contrary to the above are found, if mixed characters is found, one should be known as bitten by Kliba (impotent) snake. Thus characters of female, male and impotent snakes are described.

Description of about Snakes

Features	Darvikaara	Mandali	Rajimana	Nirvisha	Vaikaranja
Zoological interpretations with modern classification	Cobra and king cobra, Hooded	Viper and Non-poisonous snakes like Python, Gonus	Hoodless and striped	Non poisonous	Hybrid type
Appearance	Hooded snakes odd shaped symbols like wheel of chariot (monocled cobra), umbrella, swastika, hook, plough (spectacled Cobra) speedy movements	without hood but have rounded mandalas (patches) over the body. They are almost sluggish in movements	Those snakes are decorated with different intercepting lines.	Nonpoisonous	more or less a generic snakes term implying the cross over species of the mentioned above
Doshaprakopata (Effect on Tridosha)	Vata	Pitta	Kapha	According to habitat	With mixed Dosh predominance
Vicharanakaal and Ghatakaal (Time of movement)	Day time	1,2,3, quarter of night	Last quarter of night	-	It sits and blocks the road or path
Awastha, rutu Prabhava (fatal period of life)	Young	Elderly	Middle	-	Rutusandhi (in union of seasons)
Sarpavisha Rasadi (properties of Visha and Rasa)	Ruksha, Katu	Ushna, Amla	Sheet, Madhura	-	-
Poison vitiation time	Rainy season	Cold	Hot		

Garbhini and Sutika Sarpa Damshttra Lakshana (Bite of a pregnant and post delivered snake)-

पाण्डुवक्त्रस्तु गर्भिण्या शूनौष्ठोऽप्यसितेक्षणः ।
जृम्भाक्रोधोपजिह्वार्तः सूतया रक्तमूत्रवान् ॥
(च.चि. 23/133)

- If bitten by a pregnant snake, the characteristics found are Pandu (paleness of face), Shuna Ouoshta (swelling in the lips) and Asita (blackness of eyes).

- If one is bitten by a Sutika (after delivery) snake, suffers from Jrumbha (yawning), Krodha (anger), Upajivhika and Rkata Mutrav (hematuria).

सर्प विष मात्रा

Teeth	Left	Right
Upper	2 drops (yellow teeth)	4 drops (blackish teeth)
Lower	1 drop (black teeth)	3 drops (red teeth)

Sarpa Visha Vega Lakshana

Vega	Darvikara Sarpa Damsha	Mandali Damsha	Rajamanta Damsha
1 st	In first impulse (Prathama Vega) Rakta (blood) gets vitiated, becomes blackish and there by produce darkish complexion of the body. The person feels as though ants are running all over his body.	Spreads in the Raktadhatu, and changes the colour to yellow. burning sensation all over the body, oedema on the bitten limb.	Affects the Raktadhatu; and changes the colour to dull white. Horipillations, person becomes pale
2 nd	In second impulse (Dvitiyavega) Mamsadhatu (muscular tissue) gets vitiated. Swelling occurs on the bitten site.	Vitiates Mamsadhatu, deepening of yellowishdiscolouration; burningsensation all over the body, oedema on the bitten site	Spreads in Mamsadhatu, Heaviness of body, becomes more pale, fatigue, oedema in thehead
3 rd	In third impulse (Trutiya Vega) Medo dhatu (adipose tissue) gets vitiated. Heaviness of the head, loss of vision, moistness at the site of bite	Affects Medo dhatu, blurring of vision, intense thirst, putrefaction at the site, sweating	Spreads in Medo Dhatu, dimness of vision, Putrefaction at the site, excessive secretion of mucus from the nose, eyes, mouth etc.
4 th	In fourth impulse (Chaturtha Vega) the poison enters into Koshtha and vitiates the Kapha Dosha there and produces symptoms such as excessive salivation, vomiting, joints pains and lethargy	Enters Koshtha and produces fever. (in addition to the above Lakshana)	Spreads in Koshtha, stiffness of neck, Heaviness of head, stiffness of neck (in addition)
5 th	In fifth impulse (Panchama Vega) the poison enters into Asthi Dhatu (osseous tissue) and vitiates the Pranavayu and Agni. This causes joints pains, hiccups and burning sensation.	Burning sensation all above the body (in addition to the above Lakshana)	difficulty inspeaking (dysphonia), (dysarthria); fever (inaddition)
6 th	In sixth impulse (Shashthavega) the poison enters into Majjadhathu (bone marrow) and also vitiates the Grahani (Pittadhara-kala) causes severe pain in the chest, heaviness in the chest, delirium and diarrhoea.	Same as that of Darvikara Sarpa Damsha	Same as that of Darvikara Sarpa Damsha
7 th	In seventh impulse (Saptama Vega) the poison enters into Shukra Dhatu (generative tissue) thereby extremely aggravates the Vyana Vayu, dislodges the Kapha even from the minute capillaries, producing secretions of lump-like phlegm from the mouth, breaking pain in the waist and the back. Impaired functions of the mind, body, excessive salivation, perspiration and suppression of breath leading to death.	Same as that of Darvikara Sarpa Damsha	Same as that of Darvikara Sarpa Damsha

Sarpa Visha Samanya Chikitsa**Arishta Bandhana**

सर्वैवादिः सर्पैः शाखादष्टस्य देहिनः ।
दंशस्योपरि बन्धीयादरिष्टाश्चतुरङ्गुले ॥

(सु.क. 5/3)

In all persons bitten by the snake in the extremities, first of all an Arista (ligature) made from soft cotton thread, leather band or inner bark of trees should be tied tight, four Angula (8 cm) above the bite; by tying the ligature tourniquet, poison does not spread to other parts of the body.

दंशस्योपरि बन्धीयादरिष्टां चतुरङ्गुले ।
क्षौमादिभिर्वेणिकया सिद्धैर्मन्त्रैश्च मन्त्रवित् ॥
अम्बुवत् सेतुबन्धेन बन्धेन स्तभ्यते विषम् ।
न वहन्ति सिराश्चास्य विषं बन्धाभिपीडिताः ॥

(अ.ह.उ. 36/42-43)

Arista (tourniquet) should be tied four Angula (finger breadth) above the bite, with the rope of flax etc. and then fortified by potent hymns by those skilled in it. By this (tourniquet) the poison stops spreading just as the flow of water by the dam; blood vessels do not transport the poison, being subjected to pressure by the binding.

Achushana, Chedana and Dahana Karma

निष्पीड्यानूद्धरेद् दंशं मर्मसन्ध्यगतं तथा ।
न जायते विषाद्वेगो बीजनाशादिवाङ्मूरः ॥

(अ.ह.उ. 36/44)

The site of the bite should be massaged and the teeth (fangs of the snake) removed from places other than the vital spots. By so doing further stages by poisoning do not develop just as the sprout (does not develop) from the destruction of the seed.

Chetana Karma

दंशं मण्डलिनां मुक्त्वा पित्तलत्वादथापरम् ।
प्रतप्तैर्हर्मलोहाद्यैर्दहेदाशूलमुकेन वा ॥
करोति भस्मसात्सद्यो वह्निः किं नाम तु क्षतम् ॥

(अ.ह.उ. 36/45)

Except in the bite of Mandali snakes because of the possessing qualities of pitta, in the bites of

all others the site of the bite should be burnt with heated rods of gold, iron etc. or even by burning charcoal. Fire turns everything into ash, what to say of a wound; (even that is burnt away along with poison).

Dahana Karma

आचूषेत् पूर्णवक्त्रो वा मृद्भस्मागदगोमयैः ।
प्रच्छायान्तररिष्टायां मांसलं तु विशेषतः ॥
अङ्गं सहैव दंशेन लेपयेदगदैर्मुहुः ।
चन्दनोशीरयुक्तेन सलिलेन च सेचयेत् ॥

(अ.ह.उ. 36/46-47)

Incision should be made in between two tourniquets (bindings) and blood sucked through the mouth filled earlier with mud, ash, anti-poisonous drugs or cow dung; this should be done specially in fleshy parts; the bitten part should be applied with paste of anti-poisonous drugs again and again and bathed with water added with Chandana and Ushira.

Rakta Vistravana Kriya/ Sira Vedha Karma

विषे प्रविसृते विध्येत्सिरां सा परमा क्रिया ।
रक्ते निर्हियमाणे हि कृत्स्नं निर्हियते विषम् ॥

(अ.ह.उ. 36/48)

When the poison has spread in the body, the vein should be cut (and blood let out). This is the best treatment, when the vitiated blood is taken out the poison also comes out.

- **Vamana Karma**- Removal of the poison present in the stomach.
- **Mani Prayoga**- Varja, Vaidurya, Hiraka etc.
- **Agada Sevana**- Mahagada, Astanga Agada, Sarvakarmika Agada, Himavana Agada
- **Aushadha Dharana**- Punranava, Drani, Mahadroni

Shitopachara

- **Aushadha** - Tuttha Bhasma, Sanjivani Vati, Vishavajrapata Rasa, Bhimarudra Rasa, Kulakadi Vati.
- **Vatapitta Vishatura** - Basti and Virechana.
- Shioroga and Shirovirechana Karma

सर्पविष वेगानुसार चिकित्सा (सु.क. 5/20-30, अ.ह.उ. 36/74-82)

वेग	दर्वीकर सर्प	मण्डली सर्प	वजिमान सर्प
प्रथम	रक्तमोक्षण	रक्तमोक्षण	रक्तमोक्षण (तुम्बीद्वारा)मधु, घृतअगदपान
द्वितीय	मधु, घृत, अगदपान	मधु, घृत, अगदपान उपरान्त यवागू	वमन, अगदपान दर्वीकरवत्
तृतीय	विषनाशक, नस्य, अञ्जन	विरेचन, यवागूपान	दर्वीकरवत्
चतुर्थ	वमन, स्थावर विष प्रसंग वर्णित यवागू	दर्वीकरवत्	दर्वीकरवत्
पंचम्	शीतल उपचार, विरेचन, यवागू	दर्वीकरवत्	दर्वीकरवत्
षष्ठम्	शीतल उपचार, विरेचन, यवागू	काकोल्यादि, मधुरगण	तीक्ष्ण अञ्जन
शप्तम्	तीक्ष्ण अञ्जन, नस्य, तीक्ष्णशस्त्रेण मूर्ध्नि काकपद	अगदपान, अवपीडन नस्य	तीक्ष्ण अवपीडन नस्य, संज्ञास्थापन

Vishaghna Yogas according to Sarpa

Darvikarasarpa	Mandali	Rajimanta
The following potion is for the bite by Darvikara type of snake: Sindhuvara root, Shveta and Girikarnika The following snuff is for the bite by Darvikara type of snake: Kustha+ honey	Manjishta, Madhuyasti, Jivaka, Rishabhaka, Shveta, Kashmarya with leaf buds of Vata	Powder of Trikatu, Ativisa, Kusthaa, Gruhdhuma (soot), Harenuka, Tagara, Katuka with honey mix all of the above together

Vishaghna Yoga /Agada- According to Acharya Charaka

Amruta ghrita	Mahagandhahasti agada	Kakanda yoga
Chandanadi yoga	Mansayadi yoga	Kapithadi yoga
Gandhahasti agada	Mrutsanjivana agada	Kshara agada
Hingwadi yoga	Nagdantyadighrita	Shirishapuspadadi yoga
Rushabhakadi agada	Panchashirisha agada	

According to Acharya Sushruta

Ajit Mahagada	Amruta ghrita	Sanjivana agada
Ekasara agada	Rushabha agada	Drakshadi agada
Sarpavishaghnakshara agada	Kalyanakaghrita	Sarvakarmika agada
Sleshmatakadichurna	Kshara agada	Tarkshya agada
Mahasugandhi agada	Trivrutadi Mahagada	Panchashirisha agada

According to Acharya Vagbhata

Bilvadya agada	Nakulyadi agada	Himvana agada
Vajra agada	Koshatakyadiyavagu	Shirishapuspadadi yoga
Meghanada agada	Vyantardasta agada	Mandalivishanashak agada
Asthanga agada	Mahagada	Garuda anjana
Bilvadi agada	Rushabha agada	Churnaanjana
Vyantardasta agada	Lodhradi agada	Tarkshya agada

Classify snakes and describe the features of venomous and non-venomous snakes and identify their bites

Classify snakes

Snakes are classified into different families, genera, and species based on their morphological and genetic characteristics. The classification of snakes is a complex and evolving field as new species are discovered, and research provides more insights. The primary classification is based on the following taxonomic levels:

Order: Squamata- Snakes belong to the order Squamata, which also includes lizards and amphisbaenians (worm lizards).

Suborder: Serpentes- This suborder includes all snakes.

Infraorder: Alethinophidia- Alethinophidia is a major infraorder that includes all advanced snakes. It is further divided into several superfamilies, families, and subfamilies.

Superfamily: Henophidia- Henophidia includes boas and pythons.

Family: Boidae- Boas

Family: Pythonidae- Pythons

Superfamily: Caenophidia- Caenophidia includes the majority of snake species.

Family: Colubridae- Colubrid snakes, a large and diverse family that includes many harmless and mildly venomous species.

Family: Elapidae- Elapids, which are highly venomous snakes, including cobras, kraits, and coral snakes. Cobras, kraits, mambas, tiger snake, death adder, copperhead snakes and coral snakes. They are found in all parts of world except Europe.

Family: Viperidae- Vipers, another venomous family, which includes vipers and pit vipers. Russells viper, gaboon viper, saw scaled viper, puff adder. They are found in all parts of world except America.

Family: Atractaspididae- Atractaspidids, a family of venomous snakes found in Africa, the Middle East, and parts of Asia.

Family: Lamprophiidae- Lamprophiids, a family that includes a variety of snake species found in Africa.

Family: Homalopsidae- Homalopsids, a family of rear-fanged snakes found in Southeast Asia, known as mud snakes.

Family: Xenodermidae- Xenodermids, a family of snakes found in Southeast Asia.

Family: Uropeltidae- Uropeltids, a family of burrowing snakes found in South Asia.

Family: Cyndrophidae- Cyndrophids, a family of burrowing snakes found in Southeast Asia.

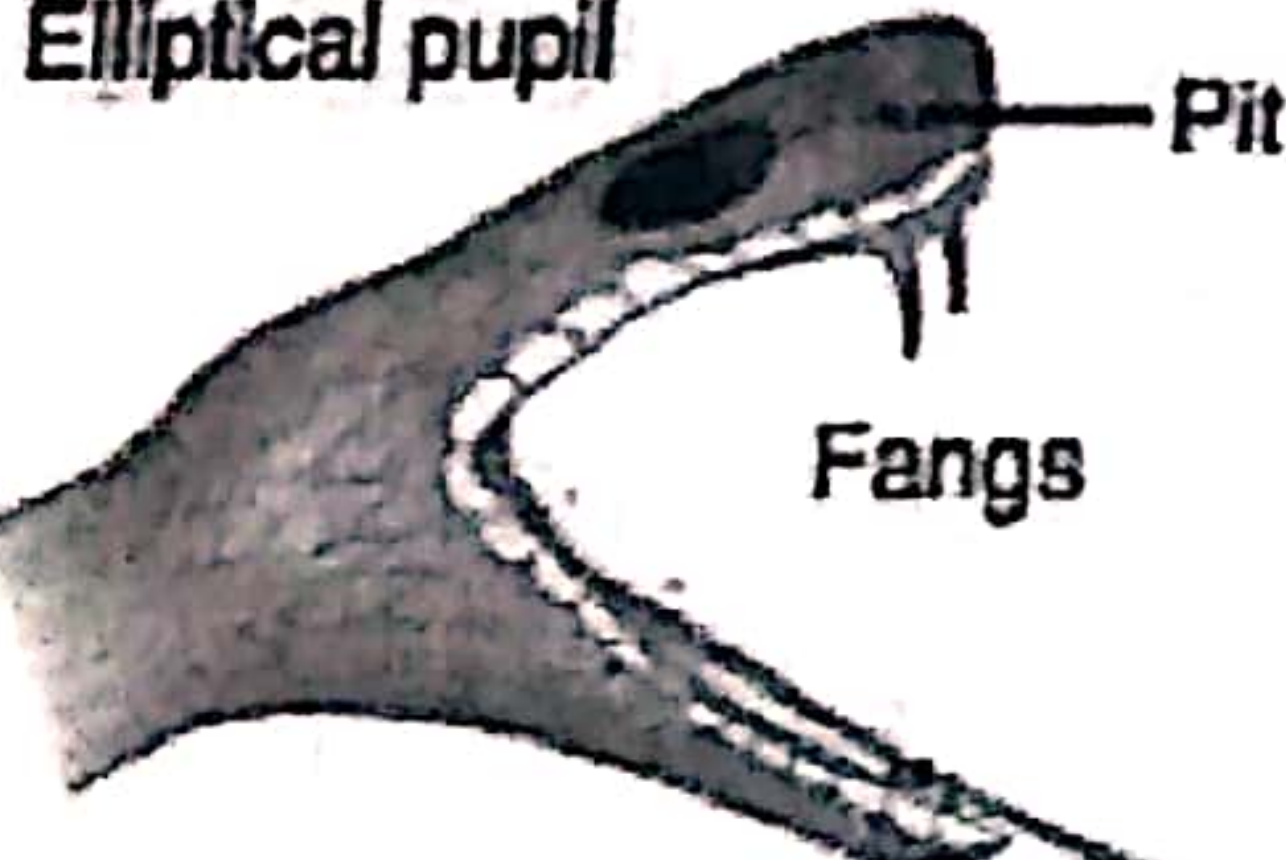
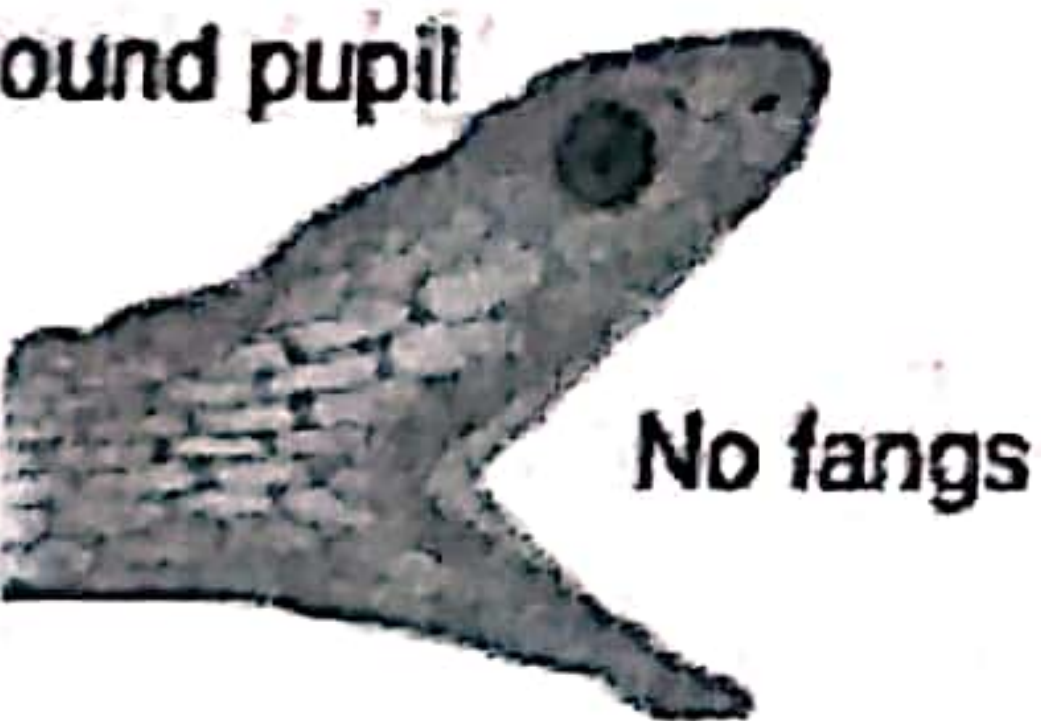
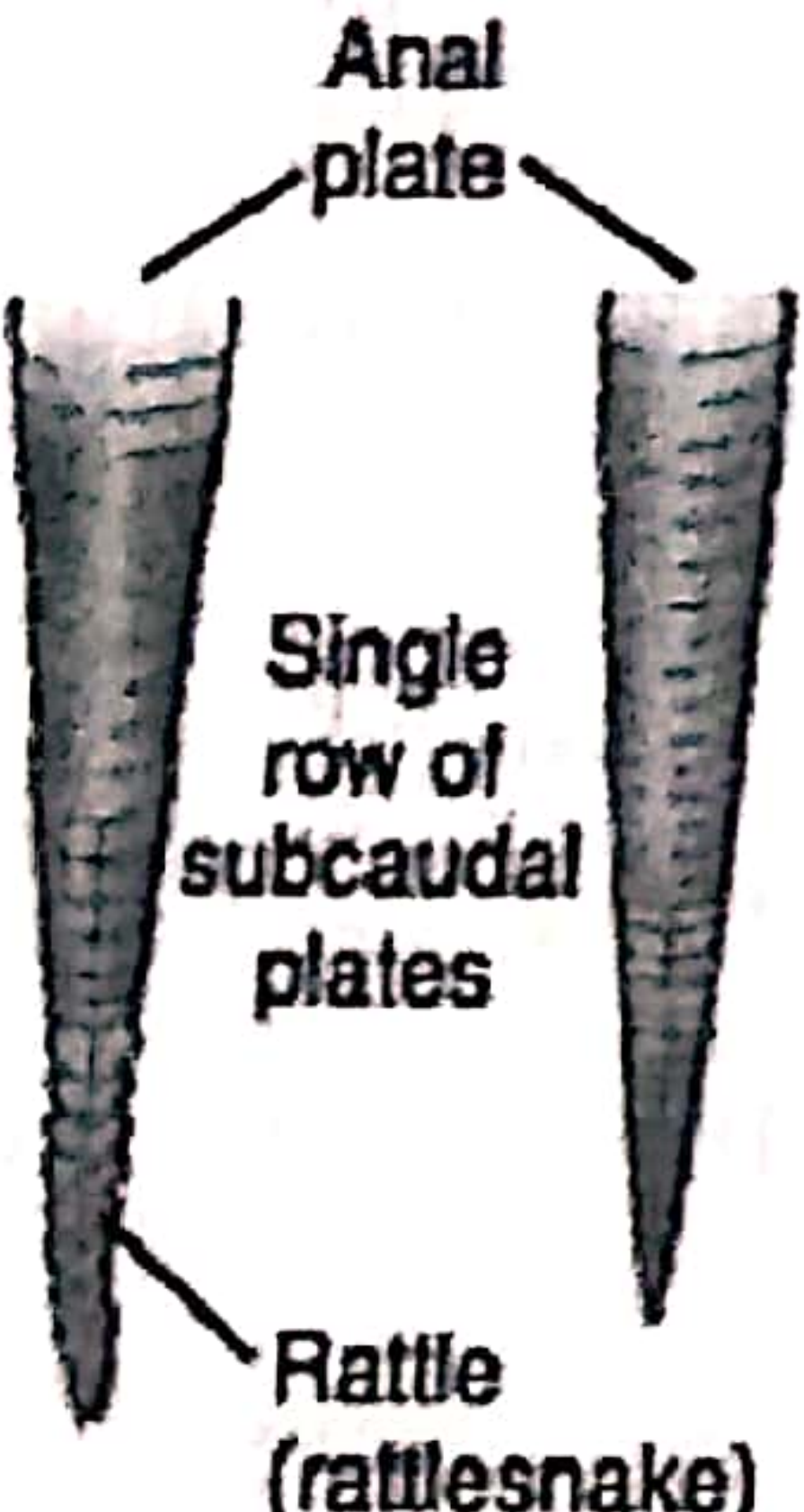
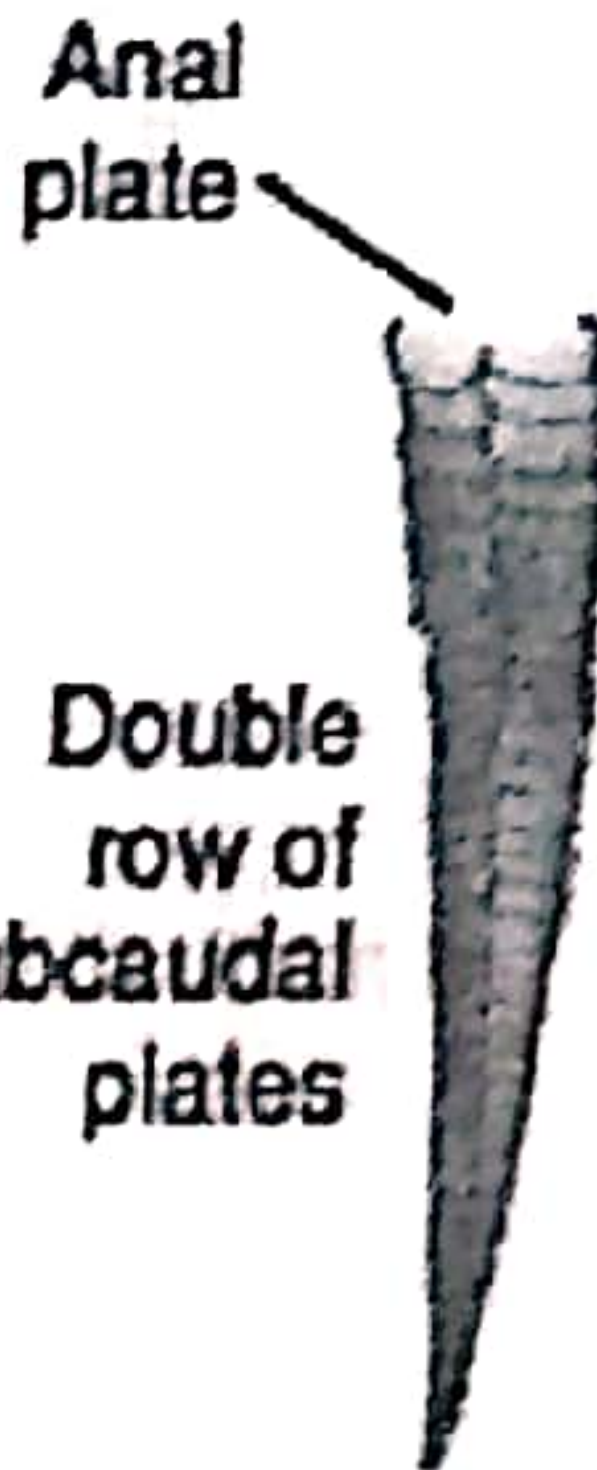
Snake poisoning (ophitoxaemia)

Most of the snake are non-poisonous, only few are poisonous.

Difference between poisonous and non-poisonous

Features	Poisonous snake	Non-poisonous snake
1. Belly scales	Large and cover the entire	Small like those on the breadth by belly back or moderately large but do not cover the entire breadth of the belly.
2. Head scales	Small (vipers) Large and with a) An opening or pit between eye and nostril (pit viper) b) Third labial touches the eye and nasal shield (Cobra or coral snake) c) Central row of scales on back enlarged and under surface of the	

	mouth has only four infralabials, the fourth being the largest (kraits).	
3. Fang	Long and grooved or canalised	Short and solid
4. Tail	Compressed	Not markedly compressed
5. Habits	Generally nocturnal	Not so
6. Bite	Two fangs marks with or without small marks of other teeth	A number of small marks in a row

VENOMOUS SNAKE	NONVENOMOUS SNAKE
 Triangle-shaped head	 Rounded head
 Elliptical pupil Pit Fangs	 Round pupil No fangs
 Anal plate Single row of subcaudal plates Rattle (rattlesnake)	 Anal plate Double row of subcaudal plates

Clinical features

According to clinical features, snakes are divided into:

A) Neurotoxic- It includes elapids, i.e. Cobra, Krait and Coral snake. Krait is the most common poisonous snake in India. These have minimal reaction locally, but produce strong neurotoxicity. They act on motor nerve cells, resembling poisoning with curare. There is weakness of legs and face. Muscle paralysis occurs in following order

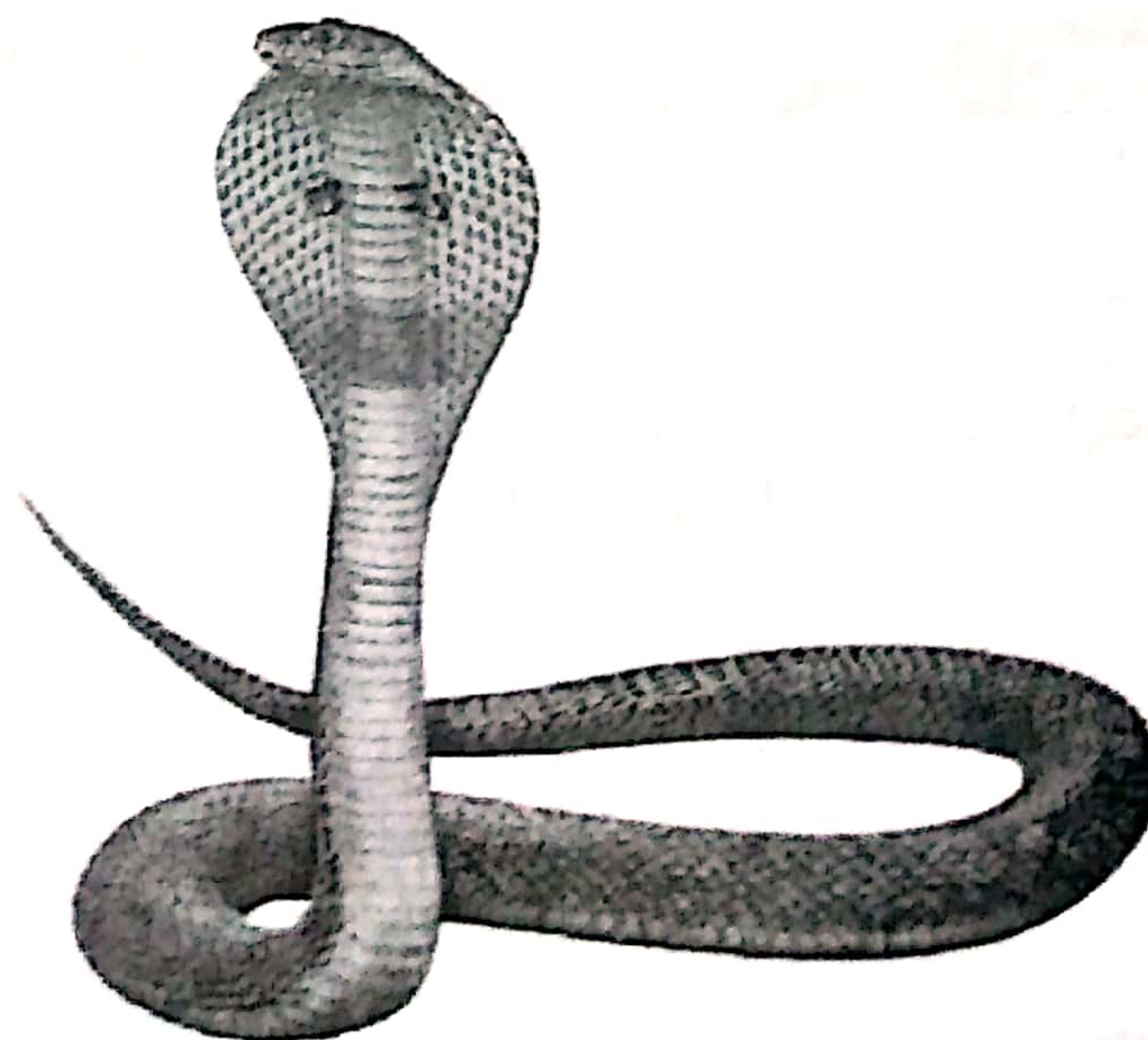
mouth (first) followed by throat and finally respiratory muscles. Cobra venom also produces convulsions (krait venom produces only paralysis).

B) Vasculotoxic (hematotoxic)- It includes vipers. Viper venom contain hemolysins and thromboplasin which cause widespread endothelial damage and hemolysis. Locally at the site of bite, there is severe oozing of blood. There may be coagulation abnormalities with death due to hemorrhagic shock. Hematuria and hemoglobinuria occurs due to hemolysis.

C) Myotoxic (musculotoxic)- These are sea snakes. Their venom produces generalized muscle pain, weakness, followed by polymyositis, myoglobinuria, hyperkalemia and increased enzymes. Finally there is respiratory and renal failure.

Describe the fatal dose, fatal period, signs and symptoms of common cobra, king cobra, russel's viper, saw scaled viper, pit vipers and common krait.

Common Cobra



Binomial name	Naja Naja
Domain	Eukaryota
Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Suborder	Serpentes
Family	Elapidae
Genus	Naja
Species	N. naja

Fatal dose-12 mg (average dose delivered per bite- 60mg)

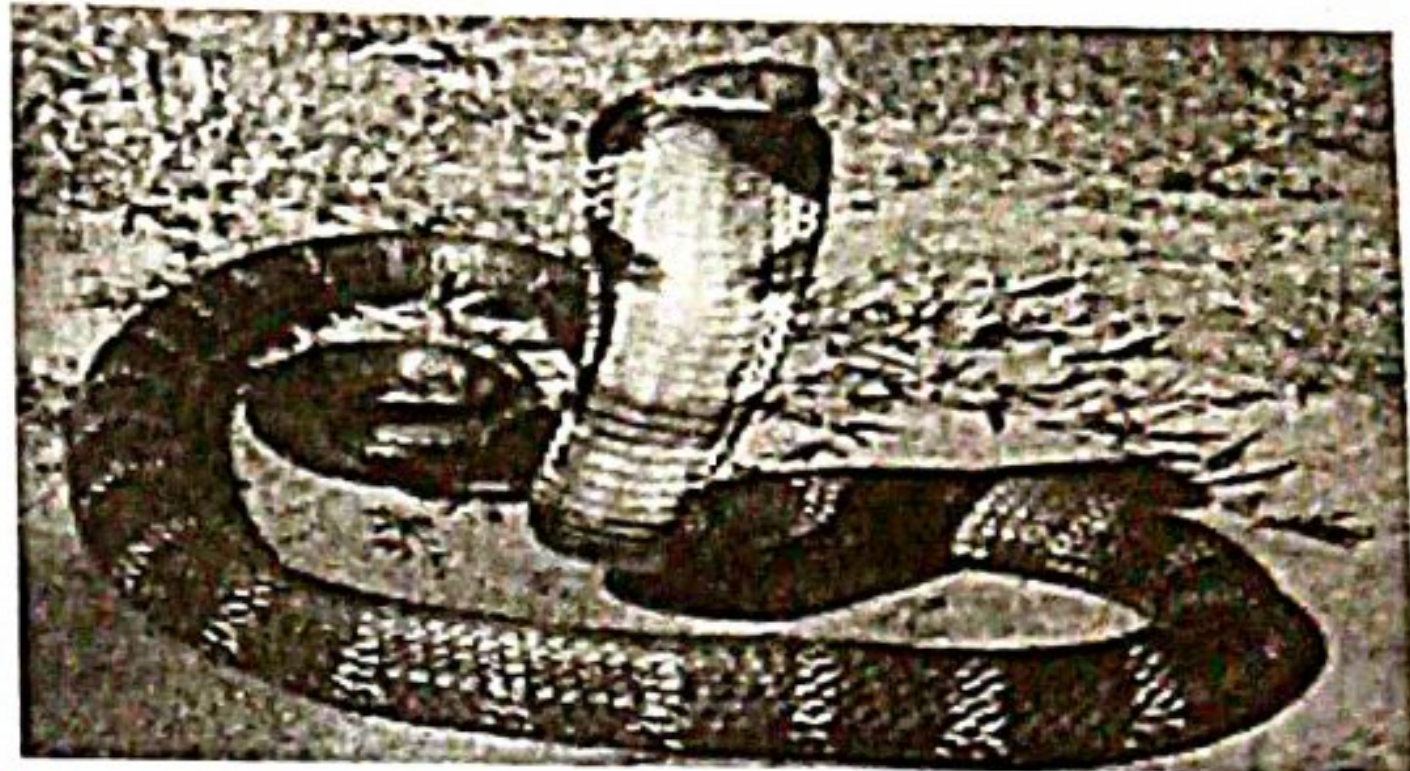
Fatal period- 8 hours

Signs and symptoms-

- Immediate, local pain (almost always present)
- Soft tissue swelling (may be progressive)
- Tissue necrosis with surrounding blistering and regional lymphadenopathy
- Nausea and vomiting (earliest sign of systemic envenomation, typically within 6 hours)
- Early neurologic findings: contraction of frontalis muscle causing elevation of brows, ptosis, ophthalmoplegia, blurred vision (ocular muscles highly sensitive to neuromuscular blockade), loss of visual accommodation due to mydriasis, perioral paraesthesia
- Later neurologic findings: dysphagia, dysphasia, paralysis of palate and jaw muscles, tongue paralysis, neck paralysis, respiratory arrest. Despite occurring later, findings may be rapidly progressive within minutes to hours.
- Autonomic dysfunction: profuse salivation, nausea, vomiting, abdominal pain, blood pressure and heart rate abnormalities
- Alteration of mental status (e.g. drowsiness, occasionally with euphoria)
- Chest pain or tightness, shortness of breath

- Eye pain, tearing, blurred vision (with eye exposure to venom from spitting cobras)

King cobra



Binomial name	Ophiophagus hannah
Domain	Eukaryota
Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Suborder	Serpentes
Family	Elapidae
Subfamily	Elapinae
Genus	Ophiophagus
Species	O. hannah

Fatal dose- 12-15 mg

Fatal period- 90 min – 24 hours

Signs and symptoms

Local effect -Pain, extensive swelling, necrosis

Systemic effect- Dizziness, ptosis, ophthalmoplegia, respiratory failure, flaccid paralysis, dysphagia, hypertension, bradycardia.

Russel's viper



Binomial name	Daboia russelii
Domain	Eukaryota
Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Suborder	Serpentes
Family	Viperidae
Genus	Daboia
Species	D. russelii

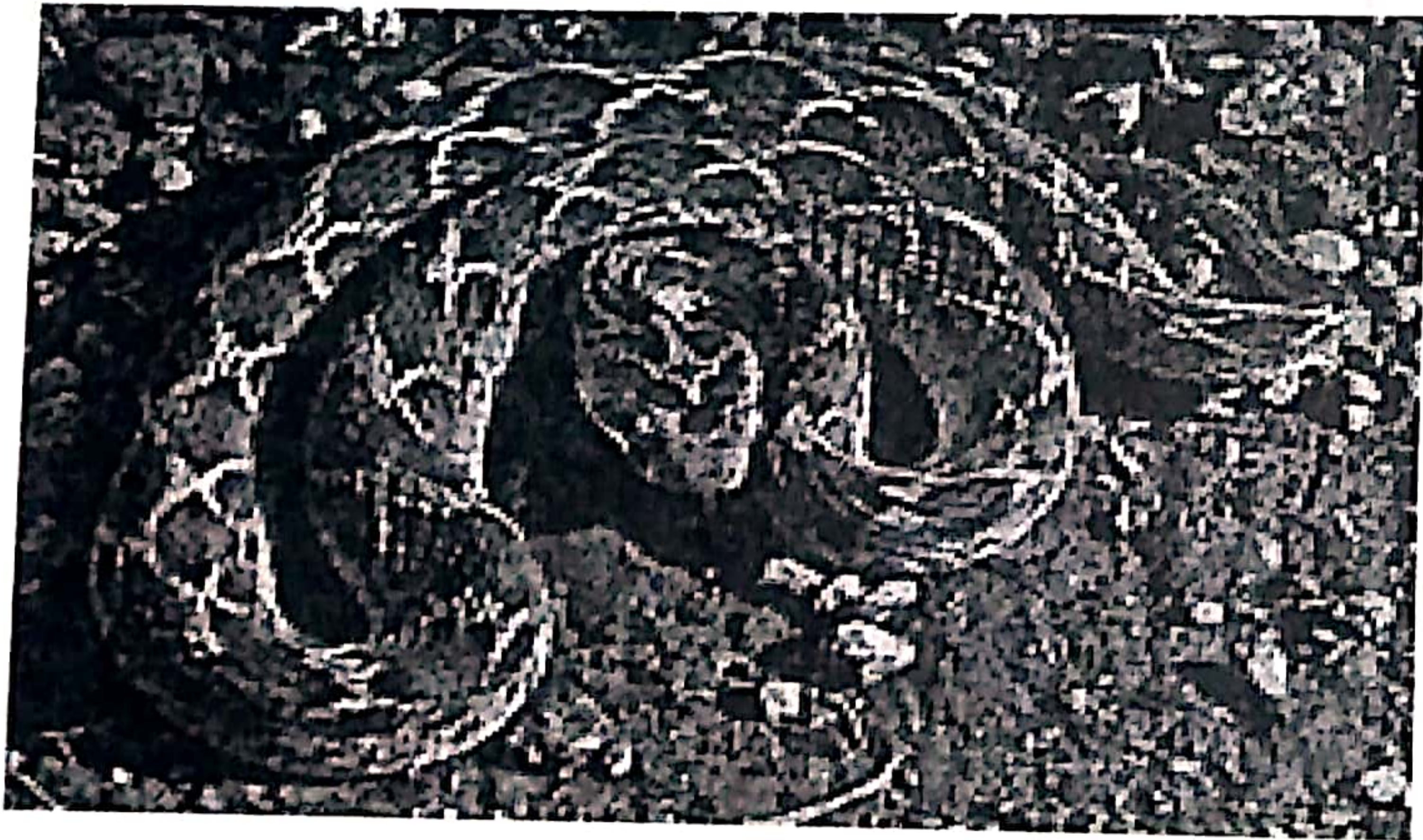
Fatal dose- 12 mg (average dose delivered per bite- 63mg)

Fatal period- 4 days

Signs and symptoms

- Severe local reactions.
- Area becomes red, swollen & painful – cellulitis.
- Persistent Bleeding, bruising, blisters, Necrosis.
- Vomiting, giddiness, abdominal pain, sweating.
- DIC, Spontaneous bleeding.
- Dilated pupils, NR to light.
- No paralysis seen.
- Hypotension, circulatory collapse, death.

Saw scaled viper



Domain	Eukaryota
Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata

Suborder	Serpentes
Family	Viperidae
Subfamily	Viperinae
Genus	Echis

Fatal dose-8 mg (average dose delivered per bite- 13-40mg)

Fatal period-41 days

Signs and symptoms

- Haemorrhage and coagulation defects are the most serious of the more serious systemic signs.
- Hematemesis, melena, hemoptysis, hematuria, and epistaxis are all common side effects that can lead to hypovolemic shock.
- Almost all patients have oliguria or anuria within a few hours to as long as six days after the bite.

Pit vipers

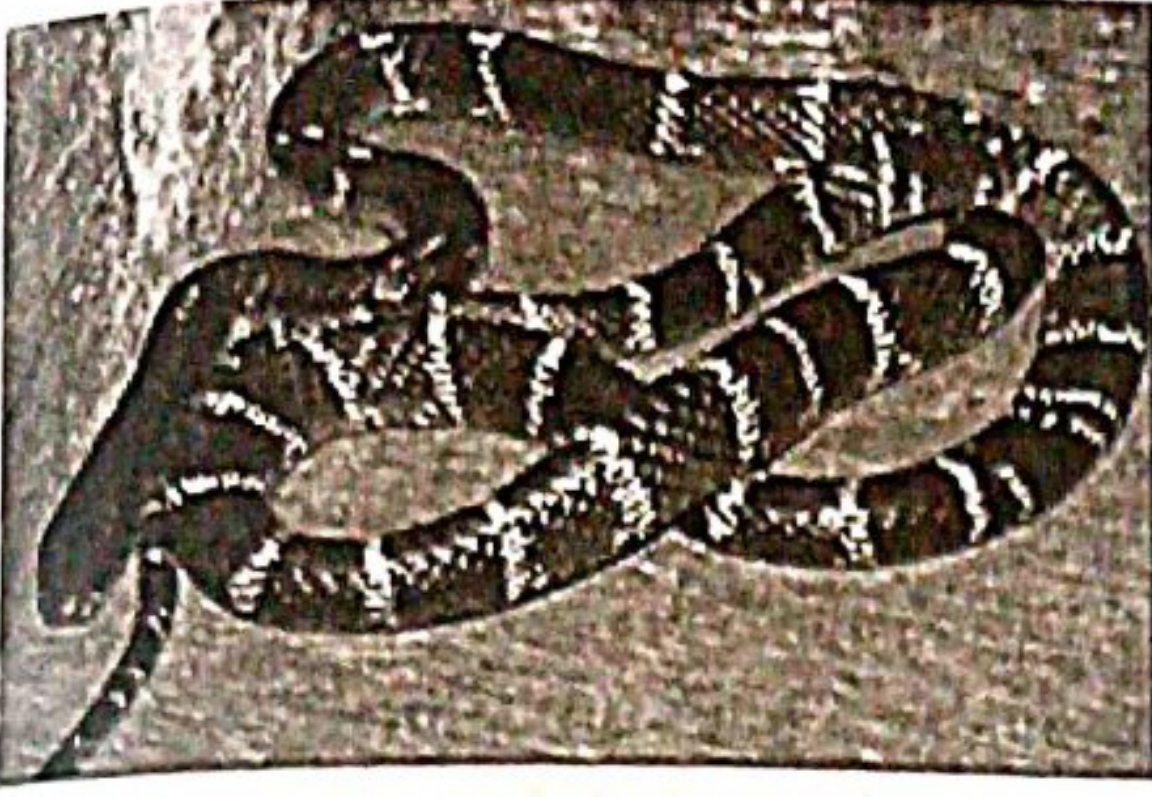
Domain	Eukaryota
Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Suborder	Serpentes
Family	Viperidae
Subfamily	Crotalinae

Fatal dose- 40-70mg

Fatal period- 3 to 6 hours

Signs and symptoms

- Severe, immediate pain with rapid swelling.
- Bruising of the skin.
- Trouble breathing.
- Changes in heart rate or rhythm.
- A metallic, rubbery, or minty taste in the mouth.
- Numbness or tingling around the mouth, tongue, scalp, feet, or the bite area.
- Swelling in lymph nodes near the bite.

Common krait

Binomial Name	Bungarus Careruleus
Domain	Eukaryota
Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Suborder	Serpentes
Family	Elapidae
Genus	Bungarus
Species	B. caeruleus

Fatal dose-6 mg (average dose delivered per bite- 20mg)

Fatal period- 18 hours

Signs and symptoms- The common krait's venom consists mostly of powerful neurotoxins, which induce muscle paralysis. Complain of severe abdominal cramps, accompanied by progressive paralysis.

Describe the management of snake bites according to recent WHO snake bite management guidelines

- Reassurance
- Application of pressure over bitten area - it delays absorption of venom
- Tie a broad firm bandage (tourniquet) - proximal to the bitten area and around the limb that occlude venous and lymphatic drainage.
- Limb immobilization
- Local incision and suction should not be done

- as it can cause local injury and nerve damage.
- Clean the wound with soap and water or iodine and cover with sterile dressing.

Polyvalent snake antivenom: in following situations :

- Rapidly progressive and severe local findings.
- There are manifestations of systemic toxicity.
- Polyvalent snake antivenin (PAV) is prepared by hyperimmunizing horse against the 4 common poisonous snakes i.e. cobra (naja naja), common krait (bungarus caeruleus), russell's viper (daboia russel) and saw scaled viper (echis carinata).
- Polyvalent anti-snake venom is useful when given within four hours of snake bite. It is of less value if delayed for eight hours and is of doubtful value after 24 hours. Each vial of polyvalent anti-snake venom neutralized about 6-8 mg of venom. Approximately 10 vial should be given.

Syllabus

- Loota Visha
- Vrischika Visha

Learning objectives

- Describe the classification, diagnosis, samanya lakshana and chikitsa of lootavisha with its contemporary aspects.
- Describe the classification, diagnosis, samanya lakshana and chikitsa of vrischika damsha (Scorpion Sting) along with its contemporary aspects.

Loota Visha

लूताविषं घोरतमं दुर्विज्ञेयतमं च तत् ।
 दुश्चिकित्स्यतमं चापि भिषग्भिर्मन्दबुद्धिभिः ॥
 सविषं निर्विषं चैतदित्येवं परिशङ्किते ।
 विषघ्नमेव कर्तव्यमविरोधि यदौषधम् ॥
 (सु.क. 8/75-76)

Bite of Luta (spiders) is highly dreadful, very



difficult to understand and very difficult even to treat by physicians of poor intellect. When there is doubt whether the spider (or bite) is poisonous or not, then anti-poisonous treatments only which are not opposite (of the Dhatus) should be done

Origin of Luta- Luta germinated from the drops of perspiration of the holy sage Vasistha fallen on the cut grass.

Classification of Luta

Based on Prognosis :

- Krcchasadhya Luta- 8
- Asadhya Luta – 8

Based on Doshaprakopa

- Vatika
- Paittika
- Slesmika
- Sannipatika

Based on Visha Prabhava

- Mild - Death occur within 15 days
- Moderate - Death occur within 7 to 10 days
- Severe/Violent - Death occur within 7 days

Site of Poison

- Shwasa (breath)
- Damshtra (fangs)
- Purisha (Faecal matter)
- Mutra (Urine)
- Shukra (Semen)
- Lalastrava (Saliva)
- Nakh (nails)
- Aartava (Menstrual fluid)

Specific Symptoms

Based on Dosha vitiation :

- Vayavya Luta-Roughness in swelling, blue in colour, joint pain
- Agneya Luta-Burning sensation, thirst, vesicles, fever.
- Saumya Luta-Hard swelling, which is white in colour, itching, mild pain
- Sannipatik Luta-Burning sensation spread all over the body. It is the combination of all the three doshas.

लूताविष अधिष्ठान (Based on site of poison)

श्वास दंष्ट्राशकृन्मूत्रशुक्रलालानखार्तवैः ।
अष्टाभिरुद्धमन्त्येता विषं वक्त्राद्विशेषतः ॥

(अ.स.उ. 44/12)

- Shwasa (Breath)** - वासेन दंशः सहसा सूयते ज्वरदाहवन्- Swelling associated with Jwara (fever) and Daha (burning sensation)
- Damshtra (Teeth)**- दंष्ट्राकृतस्तूग्रतरो विवर्णः कठिनः स्थिरः । गम्भीरशोफवांस्तोदवेदनादाहसंयुतः - Vivarna (Discoloration), Kathina (hard area), Sthira (firm), Gambhira Shopha (Swelling), Toda (pricking pain), Vedana (pain) and Daha (burning sensation).
- Shakruta (Excreta)** - दुर्गन्धी शकृता दाहकण्डूचिमि-चिमान्वितः- Durgandha (foul smell), Daha (burning sensation), Kandu (itching), Chimacimanvita (pricking pain sensation).
- Mutra (urine)**- पच्यते चाशु पक्वश्च पाण्डुः पीलुफलोपमः । मूत्रेण रक्तपर्यन्तो मध्ये कृष्णो विशीर्यते । आवर्तसदृशः शूनः पूतिः सर्पति दह्यते।- Swelling has red coloured edges, black centre, resembles a whirl, emits foul smell, spread outwards and burning sensation.
- Shukra (semen)**- शुक्रेण ग्रन्थिसंस्थानः कठिनस्ती-व्रवेदनाः- Tumour is hard and painful.
- Lalastrava (saliva)**- अल्पमूलोऽल्परुक्कोद्गो लालया कण्डूरो मृदुः नखेन चोषपिटकाकण्डूधूमायनान्वितः- Elevated rash, mild pain, itching and soft to touch.
- Nakha (nails)**- नखेन चोषपिटकाकण्डूधूमायनान्वितः-

Eruption develops which have burning sensation, itching and feeling as though hot smoke is coming out.

- **Artava (menstrual blood)**- किंशुकोदरवर्णस्तु रजसा चञ्चुमालवान्- Touch by menstrual blood, eruptions appear having the red colour resembles like garland.

Krucchasadhya and Asadhya Luta Visha Lakshana

- Krucchasadhya Luta Lakshana- Pain, itching at the site of bite, headache.
- Asadhya Luta Lakshan Bleeding, fever, burning sensation, diarrhoea and disorder due to the concentrated action of all the three deranged dosas of the body.

लूतादंश लक्षण

दंशः सामान्यतस्तासां दद्रुमण्डलसन्निभः ।
सितोऽसितोऽरुणः पीतश्चावो वा मृदुरुन्नतः ॥
मध्येकृष्णोऽथवा श्यावः पर्यन्ते जालकावृत्ताः ।
विसर्पवाञ्छोफयुतस्तप्यते बहुवेदनः ॥
ज्वराशुपाकविकलेदकोथावदरणान्वितः ।
क्लेदेन यत्स्पृशत्यङ्गं तत्रापि कुरुते व्रणम् ॥
(अ.स.उ. 37/55)

General symptoms of the bites of the Luta (spiders) are Dadru Mandala (appearance of a round rash), white black, mild red, yellow or blue in colour, Mrudu (soft), Unnata (raised up), its centre is either black or blue and resembling a net at its edges, spreading, swollen, has burning sensation and severe pain, fever, undergoes quick ripening (ulceration or suppuration), exudation, sloughing, muscles falling out, other parts touched by this slough (exudation) also develop ulcers.

Day-wise Signs and Symptoms

Luta Visha takes seven days to manifest itself completely and kill the victim:

दिनार्धं लक्ष्यते नैव दंशो लूताविषोद्भवः ।
(अ.स.उ. 44/15)

The lesion at the site of bite by spider does not manifest for half a day from the time of bite.

Day	Symptoms
1	सूचीव्यधवदाभाति ततोऽसौ प्रथमेऽहनि । अव्यक्तवर्णः प्रचलः किञ्चित्कण्डूरुजान्वितः । (अ.स.उ. 44/15) सूचीव्यधवदाभाति -Appears as though pricked by needle. अव्यक्तवर्णः- With no manifest colour. प्रचलः- Moveable slightly कण्डू रुजा- Itching and pain
2	द्वितीये त्युन्नतोऽन्तेषु पिटकैरिवचाचितः । व्यक्तवर्णो नतो मध्ये कण्डूमान् ग्रन्थिसन्निभिः । (अ.स.उ. 44/15) उन्नत - Edges are raised पिटक - Surrounded by eruptions व्यक्तवर्ण - With well manifest colour नतो मध्ये - Depressed in the centre कण्डु - Itching ग्रन्थि - Resembles a tumour
3	तृतीये सज्वरो रोमहर्षकृद्रक्तमण्डलः । शरावरूपस्तोदाढ्यो रोमकूपेषु सास्त्रवः ॥ (अ.स.उ. 44/15) ज्वर- Fever रोमहर्ष - Horripilation रक्तमण्डलः- Red patch in the shape of Mandala शरावहूपस्तोद - Severe pricking pain रोमकूपेषु सास्त्रवः - Bleeding from the hair follicles
4	महांश्चतुर्थे श्वयथुस्तापश्वासभ्रमप्रदः । (अ.स.उ. 44/15) श्वयथु - Profound swelling ताप - Temperature is raised श्वास - Dyspnoea भ्रमप्रद - Giddiness
5.	विकारान् कुरुते तांस्तान् पञ्चमे विषकोपजान् । (अ.स.उ. 44/15) Visha Prakopaja Vikara - symptoms of poisoning related to the Dosha
6.	षष्ठे व्याप्नोति मर्माणि । (अ.स.उ. 44/15) व्याप्नोति मर्माणि- The poison invades all the vital organs.
7.	सप्तमे हन्ति जीवितम् । (अ.स.उ. 44/15) हन्ति जीवितम्- Whole body is afflicted, poison destroy life (Mrityu-death).

लूताविष चिकित्सा

अथाशु लूतादष्टस्यशस्त्रेणादंशमुद्धरेत् ।
दहेत जाम्बवोष्ठाद्यैर्न तु पित्तोत्तरं दहेत् ॥
(अ.स.उ. 44/21)

Immediately after the spider bite, the sting should be removed out from the site with sharp instrument and the site burnt (cauterised) by (heated) Jambavostha etc. cauterisation not to be done if pitta symptoms are predominant.

Lepa and Seka Chikitsa

लेपयेद्गन्धमगदैर्मधुसैन्धवसंयुतैः ।
सुशीतैः सेचयेत्त्र्यानु कषायैः क्षीरिवृक्षजैः ॥
(अ.स.उ. 44/23)

The area cauterised should be covered with paste of Anti-poisonous recipes added with Madhu (honey) and Saindhava. After that bath with very cold decoction of trees with Panchavalkala.

Rakta Mokshana Chikitsa

सर्वतोऽपहरेद्रक्तं शृङ्गाद्यैः सिरयापि वा ।
स्रुते रक्ते परीषेको घृतक्षिरादिभिर्हितः ॥
(अ.स.उ. 44/24)

Blood should be let out from parts of the body either using Shrunga (sucking horn) or cutting the vein. After Rakta Mokshana, it is beneficial to pour cold ghee, milk etc. on the body.

Vamana Chikitsa

उदीर्णदोषान् बलिनो विषे महति वामयेत् ।
काकाण्डकीकोशवती लोधेन्द्रयवसैन्धवैः ॥
पटोलपत्रमरिचकरघाटप्रियङ्गुभिः ।
कृष्णाशुकनसानीपनिम्बसप्ताह्वयष्टिभिः ॥
(अ.स.उ. 44/24)

In strong person, the aggravated Dosha and poison should be removed by administrating Vamana, using Kakandaki, Koshavati, Lodhra, Indrayava, Saindhava, Patola Patra, Maricha, Karaghata, Priyangu, Krishna, Shakuna, Nipa, Nimba, Saptaha, Yashti.

Virechana Chikitsa

विरेचयेच्च त्रिफलात्रिवृत्तिकटुसैन्धवैः ।
सदन्तीपूगमृद्वीकाविडङ्गैरथवा पचेत् ॥

एभिः पलाधिकैः प्रस्थं समब्राह्मीरसं घृतात् ।
(अ.स.उ. 44/24)

Virechana be also done using Triphala, Trivruta, Trikatu and Saindhava or Danti, Puga, Mrudvika, Vidanga each half Pala in quantity is boiled in one Prastha of Ghrita and equal quantity of Brahmi and medicated Ghrita prepared used for Virechana.

Chanadanadi Lepa

चन्दनं पद्मकोशीरं शिरीषः सिन्धुवारिका ॥
क्षीरशुक्ला नतं कुष्ठं पाटलोदीच्यसारिवाः ।
शेलुस्वरसपिष्टोऽयं लूतानां सार्वकार्मिकः ॥
यथायोगं प्रयोक्तव्यः समीक्ष्यालेपनादिषु ।
(च.चि. 23/200-201)

Ingredients and method of preparation- Chandana, Padmaka, Ushira, Shirisha, Sinduvarika, Kshirashukla or Vidarai, Tagara, Kushta, Patala, Udcchya, Sariva all these pounded together with the juice of Sleshmataka.

Indication- This formulation makes an application for the spider poison.

Madhukadi Pana

मधूकं मधुकं कुष्ठं शिरीषोदीच्यपाटलाः ।
सनिम्बसारिवाक्षौद्राः पानं लूताविषापहम् ॥
(च.चि. 23/202)

Ingredients and method of preparation- Madhooka, Madhuka, Kushta, Shirisha, Udichya, Patala, Nimbi, Sariva and Kshaudra (honey).

Indication- This formulation is taken as Pana (drink) to destroy spider poison.

Kusumbhadi Yoga

कुसुम्भपुष्पं गोदन्तः स्वर्णक्षीरी कपोतविट् ।
दन्ती त्रिवृत्सैन्धवं च कर्णिकापातनं तयोः ॥
(च.चि. 23/203)

Ingredients and method of preparation- Kusumbha Pushpa, Go Danti (cow teeth), Svarnakshiri, faeces of Kapota (pigeon), Danti, Trivruta and Saindhava (rock salt).

Indication- This is applied to destroy the growth on the site of insect bite and spider poisoning.

Katabhyadi Yoga

कटभ्यर्जुनशैरीषशेलुक्षीरिद्रुमत्वचः ।

कषायकल्कचूर्णाः स्युः कीटलूताव्रणापहाः ॥

(च.चि. 23/204)

Bark of Katabhya (Nimba), Arjuna, Shirisha, Shleshmataka and bark of Kshiridruma are used as Kashaya (decoction), Kalka (paste) and Churna (powder) destroy the wounds caused by Kita (insects) and Luta (spiders).

लूताविष हेतु 10 उपक्रम

नस्याञ्जनाभ्यञ्जनपानधूमं तथाऽवपीडं कवलग्रहं च ।

संशोधनं चोभयतः प्रगाढं कुर्यात्सिरामोक्षणमेव चात्र ॥

(सु.क. 8/134)

Nasya, Anjana, Abhyanga, Pana, Dhuma, Avapidana, Kavalagraha, Tikshna Vamana, Tikshna Virechana, Siramokshana are ten Upakrama.

सर्वासामेव युञ्जीत विषे श्लेष्मातकत्वचम् ।

भिषक् सर्वप्रकारेण तथा चाक्षीवपिप्पलम् ॥

(सु.क. 8/120)

In poisoning of all the spiders, the physician should be using bark of Shleshmataka, Akshava and Pippali in all methods like Pana, Lepa, Nasya and Anjana.

Spider

Domain	Eukaryota
Kingdom	Animalia

Phylum	Arthropoda
Subphylum	Chelicerata
Class	Arachnida
Clade	Tetrapulmonata
Order	Araneae

Spiders belong to a branch of invertebrate animals called arthropods. Arthropods have the largest number of species. Spiders (order Araneae) are air-breathing arthropods that have eight legs, chelicerae with fangs generally able to inject venom, and spinnerets that extrude silk. As of August 2022, 50,356 spider species in 132 families have been recorded by taxonomists.

Components- Major venom component groups are small molecular mass compounds, antimicrobial (also called cytolytic, or cationic) peptides (only in some spider families), cysteine-rich (neurotoxic) peptides, and enzymes and proteins.

Sign and symptoms- Almost all spiders are venomous, but not all spider bites result in the injection of venom. Pain from non-venomous bites, so-called “dry bites”, typically lasts for 5 to 60 minutes while pain from envenomating spider bites may last for longer than 24 hours.

Vruschika Visha

In Ayurvedic classics Vruschika is categorised under Keeta Visha. Vruschika (scorpion) is said to oldest poisonous creature on the earth.

Classification of Vruschika

Samhita	Types	Vruschika
Charaka Samhita (Chikitsa Sthana)	2 types	1. Dooshivishaja Vruschika 2. Prana Harana/Asadhyam
Sushruta Samhita (Kalpa Sthana)	3 types	1. Mahavisha-15 types 2. Madhya Visha -3 types 3. Manda Visha- 12 types
Ashtanga Samgraha (Uttar Tantra) and Ashtanga Hridaya (Uttara Tantra)	3 types	1. Mahavisha - Powerful poison 2. Madhya Visha - Moderate Poison 3. Manda Visha - Mild poison

Morphological Features of Vruschika

Acharyas	Maha Visha Vrischika	Madhya Visha Vrischika	Manda Visha Vrischika
Sushruta Acharya	White or variegated colours, brown or reddish in body, belly being white, reddish blue, yellowish red, bluish yellow, pink, bluish white, red or grey, having 2 joints in tail, having different shapes and colours are terrifying	Red yellow or brown colour in body, smoky in belly, three joints in tail	Colours such as black, blue, brown, white and colour like cow's urine, coarse, blue black, yellow or smoky, having hair on their belly resembling algae, red or white having more number of joints in the tail than others.
Astanga Samgraha/Ashtanga Hridaya	Reddish brown, spotted variegated colour, resembles blood or fire, have only one joint, belly is reddish black or white in colour.	Smoke coloured abdomen, 3 joints, brown or reddish brown in colour.	Yellow white, blue, dry, rough, brown or dark brown in colour, hairs on the body, many joints belly being reddish or white.

Vruschika Damsha Lakshana (Characteristics of scorpion bite)

दहत्यग्निरिवादौ तु भिनत्तीवोर्ध्वमाशु च ।
वृश्चिकस्य विषं याति दंशे पश्चात्तु तिष्ठति ॥

(च.चि. 23/150)

In Vruschika (scorpion) bite, at first the part as if Dahati (burns like fire) and the poison moves upwards very quickly with tearing type of pain and later on becomes stationed in the bitten part.

Symptoms Produced by Different Types of Vrischika]

Visha Bheda	Symptoms
Maha Visha	Manifestation of symptoms of all stages at once, development of vesicles, dizziness, burning

	sensation, fever, black blood flows out from orifices and with these dreadful symptoms the person dies quickly.
Madhya Visha	Produces aggravation of doshas similar to the three kinds of snakes, Give rise to swelling of the tongue, obstruction to swallowing of food, severe fainting.
Manda Visha	Pain, shivering, stiffness of the body, flow of black colored blood from site of sting. When bitten in the extremities pain travels upwards, giving rise to burning sensation, sweating, oedema at the area and fever.

Damsha Lakshana According to Dosha Predominance

Vataja Vruschika Damsha	Pittaja Vruschika Damsha	Kaphaja Vruschika Damsha
Pain in the region of heart, stoppage of movement of Vata in upward direction, engorgement dilatation or formation of network of vein, pain in joints and bones, rolling on the ground, twisting pain in the calves and blue discoloration of the body	Loss of consciousness, warm expiration, burning sensation in the heart, bitter taste in the mouth, tearing of muscles, swelling which is reddish yellow in color.	Vomiting, loss of taste/appetite, nausea, excess of salivation, running nose, feeling of cold and sweet taste in mouth.

वृश्चिकस्य विषं तीक्ष्णमादौ दहति वह्निवत् ।
ऊर्ध्वमारोहति क्षिप्रं दंशे पश्चात्तु तिष्ठति ॥
दंशः सद्योतिरुक् श्यावस्तुद्यते स्फुटतीव च ॥
(अ.स.उ. 43/21)

Poison of Vruschika (scorpion) is penetrating and in the beginning, itself produces burning sensation just like fire, rises upwards quickly and later settles at the site of bite (sting), the site is highly painful, bluish, has pricking and bursting sensation.

वृश्चिक विष असाध्य लक्षण

दष्टो साध्येन दृग्घ्राणरसनोपहतो नरः ।
मांसैः पतिद्भिरत्यर्थं वेदनातर्तो जहात्यसून् ॥
(च.चि. 23/151)

If bitten by scorpion with incurable poison feature are loses the senses of perception Drushti (vision), Ghrana (smell) and Rasa (taste), has flesh falling down excessively, suffers from intense pain and finally move towards death.

वृश्चिक विष चिकित्सा

वृश्चिके स्वेदमभ्यङ्गं घृतेन लवणेन च ।
सेकांश्चोष्णान् प्रयुञ्जीत भोज्यं पानं च सर्पिषः ॥
(च.चि. 23/173)

In Vruschika (scorpion) sting Swedana (fomentation), Abhyanga (massage) with Ghrita (ghee) and Lavana (salt), Ushna Seka (hot sprinklings). Consume different Bhojya (food) and beverages along with Ghrita (ghee) shall be used.

कपोतविण्मातुलुङ्गं शिरीषकुसुमाद्रसः ॥
शङ्खिन्यार्कं पयः शुण्ठी करञ्जो मधु वार्षिके ।
(च.चि. 23/208)

Kapota Vit (pigeon excrement), Matulunga, juice of Shirisha Puspa, Shankini, latex of Arka, Shunthi, Karanja and Kshaudra (honey) this should be taken in scorpion sting.

Teekshana- Madhyama Visha Vruschika :

Should be treated as a case of snake bite to all intents and purposes. Around the site of bite fomentation should be done followed with

1. Prathisaaranam- with powders of Haridra, Saindhava, Trikatu and the fruits and flowers of Sirisha.

2. Lepam- Surasa + juice of Mathulunga+ Gomuthra
3. Panam- Ghee + honey or milk added with plenty of sugar.

Manda Visha Vruschika

- Chakra Taila Sechanam or warm oil cooked with the drugs of Vidaryadi Gana.
- Swedana with the application of poultices in the utkarika form prepared with anti-venomous drugs (Sirisha etc).
- Pana cooled jaggery-water mixed with Chathurjatha or Cooled milk mixed with jaggery.

Other Yogas

1. Bilwadhi Gulika.
2. Dashanga agada- good for all types of Vruschika Visha.
3. Maricha + Kaalashaka triturated in Takra should be applied
4. Pancha Sirishaagada + ghee (Cha.Chi.23)
5. According to Kashyapa, Dhoopana of human hairs, Peetha Sarshapa and Jeerna Guda. - Nrkeeshadi Dhooma
6. Visha vajra Paaka Rasa (Rasendra Saara Sangraha)
7. Applying Kalka of Nishaadala and Harithala (Bhaishajya Rathnavali)

Scorpion



- Scorpions belongs to class Arachnidae-a class of Arthropode (comprising 8 legged creatures).
- Eight legged arthropods having a hallow sting

in the last joint of their tail, which communicates by means of a duct with the poisonous glands, which secrete poison on stinging

- Abdomen-Pre abdomen and narrow taillike post abdomen terminating in telson or sting.
- Telson is vesicular in shape and at the tip possess a sharp hollow stinger with tiny pores which serves as outlet for venom, secreted by two poison glands contained in the telson.
- In India there are 6 families comprising about 89 species scorpion are found.
- Its venom is a clear, colourless, slightly acidic in nature toxalbumen and can be classified as either hemolytic(same as viperine venom) or neurotoxic (same as strychnine poisoning), coagulant, cardiotoxic.
- Its toxicity is more than that of snakes, but only a small quantity is injected.

Grading of Systemic Features of Scorpion Sting

Grade 1 - severe excruciating local pain at the site of sting which radiates along with corresponding dermatomes.

Grade 2-local signs associated with profuse sweating, salivation, hyper or hypotension, cold extremities and bradycardia.

Grade 3 - pulmonary oedem with hyper or hypotension and cold extremities,

Grade 4 - warm extremities, tachycardia, hypotension, pulmonary oedema and shock.

Grade 5-death.

Clinical Features

- Local burning pain, swelling, paraesthesia.
- Sweating, salivation, vomiting, abdominal cramps.
- Mydriasis.
- Hypotension followed by hypertension, bradycardia followed by tachycardia, cardiac arrhythmias, myocarditis.
- Convulsion

- Oliguria
- Pulmonary oedema.

Differential Diagnosis

- Alcohol withdrawal
- Botulism
- Hysteria
- Meningitis
- Opium poisoning
- Tetanus

Treatment

- Immobilize the sting limb by application of tourniquet above the bite.
- Local ice application, incise and use suction, and wash with a weak solution of ammonia, borax etc.
- A local anesthetic is injected at the site to lessen the pain.
- IV fluids and oxygen according to need.
- A specific anti venom is available for most species.
- Diazepam for convulsions.
- Metoclopramide for vomiting.
- Atropine is valuable in preventing pulmonary edema.

Autopsy findings

- Local part swollen, inflamed, sting may be present, surrounding tissue may show hemorrhagic infiltration.
- The sting sites are usually at peripheral sites or part of body such as toes, fingers, palms, soles, etc. However, occasionally, other part may be involved such as back, shoulder, etc.
- Systemic examination reveals pulmonary edema, pulmonary hemorrhages, gastrointestinal tract hemorrhage, intracerebral hemorrhage, signs of consumption coagulopathy, myocarditis.

Medico Legal aspect- Accidental envenomation occurs and fatality is more in children.

Syllabus

- Mushika visha and its contemporary relevance.
- Alarka visha and its contemporary relevance.

Learning objectives

- Describe leptospirosis and rat bite fever with special reference to mushika visha.
- Describe rabies and its management with special reference to alarka visha.

Mushika Visha and its Contemporary Relevance

मूषक विष अधिष्ठान-शुक्र

मूषक भेद (18)-

- | | | |
|--------------|-------------|----------|
| • लालन | • चपाल | • पुत्रक |
| • हसिर | • चिकिर | • अजिन |
| • कषायदंत | • कुलक | • कोकिल |
| • कपिल | • असित | • अरुण |
| • शबल | • श्वेत | • कपोताभ |
| • पलितउन्दुर | • छुछुन्दुर | • रसाला |

मूषक विष सामान्य लक्षण

आचार्य चरकानुसार-

आदंशाच्छोणितं पाण्डु मण्डलानि ज्वरोऽरुचिः ।
लोमहर्षश्च दाहश्चाप्याखुदूषीविषादिते ॥

(च.चि. 23/147)

The signs and symptoms of Mushaka Visha (rat bite) are Pandura Rakta Srava (pale blood coming out in the region of bite), Mandala (rashes), Jwara (fever), Aruchi (anorexia), Loma Harsha (horripilation) and Daha (burning sensation).

आचार्य सुश्रुतानुसार-

भवन्ति चैषां दंशेषु ग्रन्थिमण्डलकर्णिकाः ।
पिडकोपचयश्चोग्रः शोफश्च भृशदारुणः ॥

(सु.क. 7/27)

Poison of rat develop of tumours, discoloured patches with small eruptions which are dreadful and accompanied with severe swelling.

मूषकविष असाध्य लक्षण

मूर्च्छाङ्गशोथवैवर्ण्यक्लेदशब्दाश्रुतिज्वराः ।
शिरोगुरुत्वं लालासृक्छर्दिश्चासाध्यमूषिकैः ॥
(च.चि. 23/148)

In Asadhya (incurable) Lakshana of Mushaka Visha (rat poisoning) are as follows

1. Murccha - Fainting
2. Shotha - Swelling in the part
3. Vaivarnya -Discoloration
4. Kleda-Moistening
5. Ashabda Shruti-Deafness
6. Jwara -Fever
7. Shirogurutva - Heaviness in head
8. Lala Srava Sarkata - Salivation
9. Rakta Chardi - Hematemesis.

रसाञ्जनहरिद्रेन्द्रयवकट्विषु वा कृतम् ।
प्रातः सातिविषं कल्कं लिह्यान्माक्षिकसंयुतम् ॥
तण्डुलीयकमूलेषु सर्पिः सिद्धं पिबेन्नरः ।
आस्फोतामूलसिद्धं वा पञ्चकापित्यमेव वा ॥

(सु.क. 7/39-40)

Juice of kapittha and cow dung added with honey may be licked or powder of Rasanjana, Haridra, Indrayava and Katvi or paste of Ativisha, mixed with honey should be licked in the morning. Ghee mixed and boiled with roots of Tanduliyaka or with root of Asphota or Pancakapittha (root bark, flower, leaves and fruit of Kapittha) may be consumed.

General treatment of Mushika Visha

1. Cauterization of bite site and blood letting from bite site should be done.
2. Drugs for local application after cauterization and blood letting; Paste of Shirish (Albizia lebbeck), Haridra (Curcuma longa), Kushtha (Saussurea lappa), Kesar (Crocus sativus), Guduchi (Tinospora cordifolia) should be applied on the bite site.

Paste of Trivrutta (Operculina trupethum), Shweta Aparajita (Clitoria ternate), root of Bilva (Aegle marmelos) and Guduchi (Tinospora cordifolia) should be applied on bite site.

3. Vamana (Vomiting) - Paste prepared by maceration roots of Shirisha (Albizia lebbeck), Katutumbi (Langenaria vulgaris), fruit of Madana (Randia spinosa) and Devadali (Luffa echinate) along with curd and consumed to induce vomiting. This is useful in all types of rat bite.
4. Virechana (Purgation) - For purgation use the paste of Trivrutta, Danti and Triphala.
5. Nasya (Nasal medication) - Fruits of Shirisha are used for preparing drugs for nasal administration.
6. Anjana (Collyrium) - Juice of cow dung mixed with Trikatu may be used for making preparation of collyrium.
7. Drugs useful in Mushika Damsha-
 - Kiratatika, Amruta, Manjishtha, Arjuna Twak, Palasha, Kashmarya, Kshirvidari decoction.
 - Kapitha juice and juice of cow dung along with honey should be given.
 - Paste of Ativisha along with honey useful.

Rat Bite

Rat-bite fever (RBF) is an infectious disease caused by two different bacteria:

- Streptobacillus moniliformis, the only reported bacteria that causes RBF in North America (streptobacillary RBF)
- Spirillum minus, common in Asia (spirillary RBF, also known as sodoku)

Symptoms and signs of streptobacillary RBF include:

- Fever
- Vomiting
- Headache
- Muscle pain
- Joint pain or swelling (about 5 in 10 people with RBF have this)
- Rash (occurs in about 3 out of 4 people with RBF)

Symptoms usually begin 3 to 10 days after

contact with the bacteria, but can be delayed as long as 3 weeks.

Treatment

Treatment with antibiotics is the same for both types of infection. The condition responds to penicillin, and where allergies to it occur, erythromycin or tetracyclines are used.

Medico Legal aspect- Accidental

Alarka Visha and Its Contemporary Relevance

निदान and सम्प्राप्ति

श्वशृगालतरक्षवृक्षव्याघ्रादीनां यदाऽनिलः ।
 श्लेष्मप्रदुष्टो मुष्णाति संज्ञां संज्ञावहाश्रितः ॥
 तदा प्रदास्तलाङ्गूलहनुस्कन्धोऽतिलालवान् ।
 अत्यर्थबधिरोऽन्धश्च सोऽन्योन्यमभिधावति ॥
 तेनोन्मत्तेन दष्टस्य दंष्ट्रिणा सविषेण तु ।
 सुप्तता जायते दंशे कृष्णं चातिदावत्यसृक् ॥
 दिग्धविद्धस्य लिङ्गेन प्रायशश्चोपलक्षितः ।

(सु.क. 7/43-45)

When Vata getting aggravated in the body of dog, fox, jackal, hyena, bear, tiger etc. combines with aggravated Kapha and accumulates in the channels of their sense organs and causes loss of sensation, then the animal runs around very much, hanging its tail, lower jaw and shoulder, exudes more saliva, becomes deaf and blind, begins to bite every one and becomes insane. When bitten by the teeth of such an insane (rabid) animal the person develops loss of sensation, black colour and heavy bleeding at the site of the bite, symptoms of wound made by poisoned weapon manifest here also if neglected. The person so bitten, does the same kind of activities greatly of the animal which has bitten him and finally dies without any activity.

He, who is bitten by such rabid animal if he sees the image of the same animal either in water or mirror, then that should be understood as a fatal sign, when the person becomes afraid even by seeing or touching water, without any other cause, then that condition known as Jalatrasa (hydrophobia) which also is to be considered as a fatal sign.

He, who is afraid of water though not bitten by insane animal or soon after getting from sleep or a person who is healthy becomes afraid of water- these three kinds of persons do not recover (they surely die).

अलर्क विष लक्षण

दंशस्तेन विदष्टस्य सुप्तः कृष्णः क्षरत्यसृक् ।
हृच्छिरोरुज्वरस्तम्भतृष्णामूर्च्छोद्भवोऽनु च ॥
अनेनान्येऽपि बोद्धव्या व्याला दंष्ट्राप्रहारिणः ।
सृगालाश्वतराश्वर्क्षद्वीपिव्याघ्रवृकादयः ॥
कण्डूनिस्तोदवैवर्ण्यसुप्तिक्लेदज्वरभ्रमाः ।
विदाहरागरुक्पाकशोफग्रन्थि विकुञ्चनम् ॥
दंशावदरणं स्फोटाः कर्णिका मण्डलानि च ।
सर्वत्र सविषे लिङ्गं विपरीतं तु निर्विषे ॥

(अ.सं.उ. 46/10-13)

Bitten by such a dog the person becomes sleepy (unconscious), black coloured blood comes out from the site of bite, develops pain in the heart and head, fever, rigidity, thirst and fainting develop later. By these symptoms, even the bites of other wild beasts, like the jackal, mule, horse, bear, panther, tiger, wolf which bite by their teeth are also to be under stood (when these become mad/ rabid). Itching, constant pain, discolouration, loss of tactile sensation, exudation, fever, giddiness, burning sensation inside the abdomen, the site becoming red, painful, suppurative, swollen, tumors developing, contractures, tearing and falling off of muscles, blebs (vesicles) ring-like patches appearing all over the body- these are the symptoms of bites having poison in them, the opposite of these are of bites not having poison.

Shva Damsha Lakshana (features of dog bite)

श्वात्रिदोषप्रकोपात्तुतथाधातुविपर्ययात् ।
शिरोऽभितापीलालास्राव्यधोवक्त्रस्तथाभवेत् ॥
(च.चि. 23/175)

The dog bite causes the vitiation of Tridosha and aggravation of Dhātu manifests following clinical feature

1. Shira Abhitapi- Headache
2. Lalasrava - Salivation
3. Adhovaktra - Drooped face.

अलर्क विष असाध्य लक्षण

येन चापि भवेद् दष्टस्तस्य चेष्टां रुतं नरः ॥
बहुशः प्रतिकुर्वाणः क्रियाहीनो विनश्यति ।
दंष्ट्रिणा येन दष्टश्च तद्रूपं यस्तु पश्यति ॥
अप्सु वा यदि वाऽऽदर्शेऽरिष्टं तस्य विनिर्दिशेत् ।

(सु.क. 7/46-47)

Person is bitten by such rabid animal if he sees the image of the same animal either in water or mirror, then that should be understood as a fatal sign; when the person becomes afraid even by seeing or touching water, without any other cause, then that condition known of Jalatrasa (hydrophobia) which also is to be considered as a fatal sign.

जल संत्रास-

जलदर्शनसंस्पर्शशब्देभ्यो यश्च सन्त्रसेत् ।
अदष्टमपि तं जह्याज्जलसन्त्रासरोगिणम् ॥

(अ.सं.उ. 46/12)

He who gets freighted by the sight, touch and sound of water even though not bitten by rabid dog etc. such a patient of the disease (Jalasantrasa-hydrophobia) should be rejected

अलर्कविष चिकित्सा-

दंशं विदागव्य तैर्दष्टे सर्पिषा परिदाहितम् ॥
प्रदिह्यादगदैः सर्पिः पुराणं पाययेत् च ।
अर्कक्षीरयुतं ह्यस्य दद्याच्चापि विशोधनम् ॥
श्वेतां पुनर्नवां चास्य दद्याद्धतूरकायुताम् ।
पललं तिलतैलं च रूपिकायाः पयो गुडः ॥
निहन्ति विषमालर्कं मेघवृन्दमिवानिलः ।
मूलस्य शरपुङ्खायाः कर्षं धतूरकार्थिकम् ॥
तण्डुलोदकमादाय पेषयेत्तण्डुलैः सह ।
उन्मत्तकस्य पत्रैस्तु संवेष्ट्यापूपकं पचेत् ॥
खादेदौषधकाले तमलर्कविषदूषितः ।
करोति श्वविकारांस्तु तस्मिञ्जीर्यति चौषधे ॥
विकाराः शिशिरे याप्या गृहे वारिविवर्जिते ।
ततः शान्तविकारस्तु स्नात्वा चैवापरेऽहनि ॥
शालिषष्टिकयोर्भक्तं क्षीरेणोष्णेन भोजयेत् ।
दिनत्रये पञ्चमे वा विधिरेषोऽर्धमात्रया ॥
कर्तव्यो भिषजाऽवश्यमलर्कविषनाशनः ।
कुप्येत् स्वयं विषं यस्य न स जीवति मानवः ॥
तस्मात् प्रकोपयेदाशु स्वयं यावत् प्रकुप्यति ।

(सु.क. 7/51-51)

Blood (containing poison) should be removed from the site of bite and site burnt by pouring hot ghee on it; next agada (anti-poisonous medicine) should be applied as warm poultice on the area, then he should be made to drink old ghee; purgative drugs mixed with Dhatturaka should be given; Palala (paste of Tila) or Tila Taila mixed with milk sap of Arka should be administered or paste of Shveta Punarnava mixed with milky, sap of Rupika (Arka) and Guda (jaggery) mixed together and consumed destroys the poison of rabid dog etc. just like wind drives away the cluster of clouds.

Root of Sharapunkha one Karsha (10 gms) and root of Dhatura half Karsha (5 gm) are macerated along with Tandula (rice) using Tandulodaka (rice-wash). this ball of paste is enveloped with leaves of Unmatta (Dhatura) and Apupa (pan cake) made with it. This cake should be consumed at the time of meals (mid- day) by the person suffering from poison of rabid animal.

If after the digestion of this pan cake the person still performs the activities of rabid animal as before, then he should be kept confined in a cold room and devoid of water.

After the abnormal symptoms subside, he should be given bath the next day, he must be made to take warm meals of boiled rice or Sashtika rice along with milk. This kind of treatment should be done for three of five days and by half its degree for further days (till abnormal symptoms subside).

The person in whom the poison increases on its own accord, he does not survive, hence it (poison) should be made to increase quickly, if not increasing on its own.

Rabies / Hydrophobia

Introduction

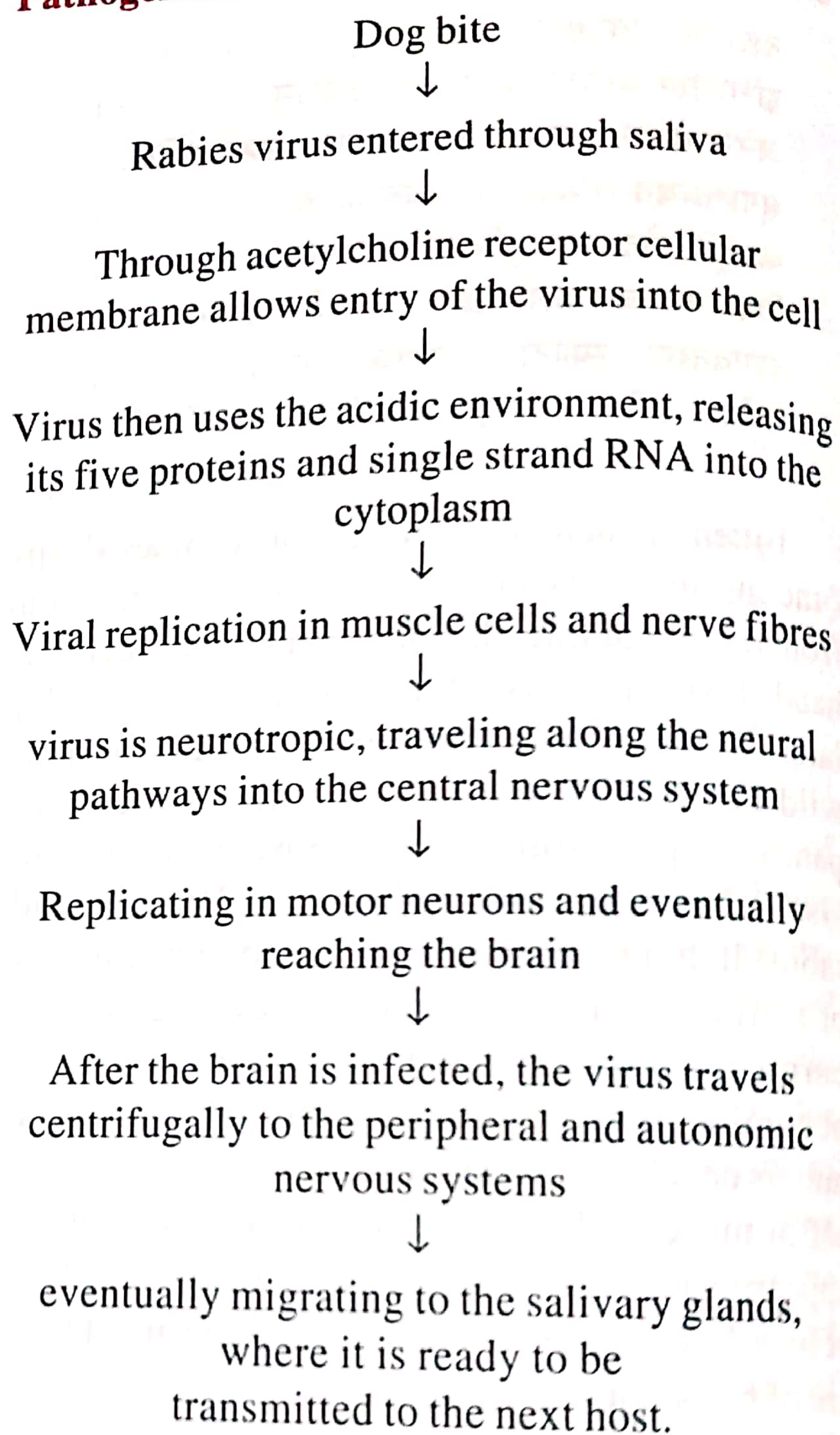
Rabies is a viral disease that causes inflammation of the brain in humans and other mammals.

It is spread when an infected animal scratches or bites. Saliva from an infected animal can also

transmit rabies if the saliva comes into contact with the eyes, mouth, or nose. Dogs are the most common animal spreading rabies via dog bite.

Virus - lyssavirus in family of rhabdovirus (single stranded RNA virus).

Pathogenesis



Incubation period : 4 days to 6 years (Mean : 1-3 months)

Sign and symptoms

1. Initial signs and symptoms - nonspecific such as fever and headache.
2. As rabies progresses and causes inflammation of the brain and meninges, signs and symptoms developed as slight or partial paralysis, anxiety, insomnia, confusion, agitation, abnormal behaviour, paranoia,

terror, hallucinations, progressing to delirium, and coma.

3. The person may also have hydrophobia.

Diagnosis

- RTPCR (reverse transcription polymerase chain reaction) for viral isolation from infected saliva, CSF or brain.
- Fluorescent antibody test.
- Histological demonstration of Negri bodies in brain.

Prognosis

Death usually occurs 2 to 10 days after first symptoms. Survival is almost unknown once symptoms have presented, even with the administration of proper and intensive care

Differential diagnosis- Encephelitis

Treatment

1. Prevention—Pre-exposure vaccine: recombinant vaccine VR-G
2. Treatment after exposure –
 - a. Thoroughly wash the wound as soon as possible with soap and water for approximately five minutes
 - b. Povidone-iodine or alcohol is then recommended to reduce the virus further.
 - c. One dose of human rabies immunoglobulin (HRIG) and four doses of rabies vaccine over a 14-day period. The immunoglobulin dose should not exceed 20 units per kilogram body weight. HRIG should be injected around the bites by deep intramuscular injection.

Schedule of rabies vaccination

- 1st dose - as soon as possible after exposure,
- Additional doses on days 3, 7 and 14 after the first.

Pre-exposure immunization

It is indicated in high risk individuals like veterinarians, animal handlers, postmen and laboratory workers. Three injections are given on day 0, 7, 21 with a booster dose after 1 year. This gives immunity for 3 years after which it has to be repeated.

Re-exposure immunization

If previously immunized individual is again bitten by a stray animal then 2 doses 1 week apart are administered. If the previous exposure is beyond 3 years, the complete vaccination schedule is recommended.

Syllabus

- Keeta visha
- Vector borne diseases.

Learning objectives

- Describe the classification of keeta, samanya sakshana and chikitsa of keeta damsha with special importance to regional prevalence.
- Discuss the application of visha chikitsa in vector borne diseases like chikungunya, dengue and malaria.

Keeta Visha

कीट उत्पत्ति (Origin of insects)

सर्पाणामेव विण्मूत्रशुक्राण्डशवकोथजाः ।
दोषैर्व्यस्तैः समस्तस्तैश्च युक्ताः कीटाश्चतुर्विधाः ॥

(अ.ह.उ. 37/1)

Kitas (insects) are born from the decomposed mass of Vit (excreta), Mutra (urine), Shukra (semen), Anda (egg) or carcass of snakes only, they (insects) are of four kinds. viz, one each possessing the qualities of individual Doshas separately and one with the qualities of all the dosas together.

कीट प्रकार (Types of insects)

आचार्य सुश्रुत के अनुसार कीट चार प्रकार के होते हैं—

1. वातज कीट
2. पित्तज कीट
3. कफज कीट
4. सन्निपातज कीट

कीट संख्या (No. of insects- 67)

1. वातज कीट - 18

कुम्भीनस, तुण्डिकेरी, श्रङ्गी, शतकुलीरक, उच्चिटिङ्गा, अग्निनामा, चिच्चिटिङ्ग, मयूरिका, आवर्तक, उरभ्र, सारिका, मुखवैदल, शरावकुर्द, अभीराजि, परुष, चित्रशीर्षक, शतबाहु, रक्तराजि.

2. पैत्तिक कीट - 24

कौण्डिन्यक, कणभक, वरटी, पत्रवृश्चिक, विनासिका, ब्राह्मणिका, बिन्दुल, भ्रमर, बाह्यकी, पिञ्चित, कुम्भी, वर्चःकीट, अरिमेदक, पद्मकीट, दुन्दुभिक, मकर, शतपादक, पञ्चालक, पाकमत्स्य, कृष्णातुण्ड, गर्दभी, क्लीत, कृमिसरारी, उत्क्लेशक

3. कफज कीट - 13

विश्वम्भर, पञ्चशुक्ल, पञ्चकृष्ण, कोविल, सैर्यक, प्रचलक, बलभ, किटिभ, सूचीमुख, कृष्णगोधा, कषायवासिक, गर्दभक, त्रोटक

4. सन्निपातज कीट 12

तुङ्गीनास, विचिलक, तालक, वाहक, कोष्ठागारी, क्रिमिकर, मण्डलपुच्छक, तुण्डनाभ, सर्षपिक, वल्गुलि, शम्बुक, अग्निकीट

According to सुश्रुत संहिता

- मक्षिका
- कणभ
- गृहगोधिका
- शतपदी
- मण्डूक
- पिपिलिका
- मशक
- गोधेरक
- जलौका
- त्रिकण्टक

असाध्य कीटदंश-गोधेरक, स्थालिका, अग्निप्रभा, भृकुटी, कोटिक, श्वेता

कीटदंश सामान्य लक्षण (Common sign and symptoms)

वेगाश्च सर्पवच्छोफो वर्द्धिष्णुर्विस्रक्तता ।
शिरोऽक्षिगौरवं मूर्च्छा भ्रमः श्वासोऽतिवेदना ॥
सर्वेषां कर्णिका शोफो ज्वरः कण्डूरोचकः ।

(अ.ह.उ. 37/5)

The vegas (stages of poisoning) are similar to those of the snake bite, swelling increasing in size, blood becomes foul smelling, feeling of heaviness of the head and eyes, fainting, giddiness, dyspnoea and severe pain (at the site) appearance of a circular ring (around the site) swelling, fever, itching and loss of appetite/taste are common to all (bites of all kinds of insects).

कीटदंश दोषानुसार लक्षण

दष्टस्य कीटैर्वायव्यैर्दंशस्तोदरुजोल्बणः ।
आग्नेयैरल्पसंस्त्रावो दाहरागविसर्पवान् ॥
पक्वपीलुफलप्रख्यः खर्जूरसदृशोऽथ वा ।
कफादिकैर्मन्दरुजः पक्वोदुम्बरसन्निभः ॥
स्त्रावाढ्यः सर्वलिङ्गस्तु दंशः स्यात्सन्निपातिकैः ।
(अ.ह.उ. 37/5)

वातज कीट - Pricking pain, increasing in intensity at the site of the bite.

पित्तज कीट - Slight exudation, severe burning sensation, redness and swelling resembling a ripe fruit of Pilu or a Kharjura and spreading out;

कफज कीट - Mild pain, swelling resembling a ripe Udumbara fruit.

सन्निपातिक कीट - Copious exudation

Savisha Keeta Damsha Lakshana (Clinical features of poisons insects bite)

कण्डूनिस्तोदवैवर्ण्यसुप्तिक्लेदोपशोषणम् ।
विदाहरागरुक्पाकाः शोफो ग्रन्थिनिकुञ्चनम् ॥
दंशावदरणंस्फोटाः कर्णिकामण्डलानिच ।
ज्वरश्चसविषे लिङ्गविपरीतं तु निर्विषे ॥
(च.चि. 23/178-179)

1. Kandu - Itching
2. Nistoda - Piercing pain
3. Vaivarnya - Discoloration
4. Supti - Numbness
5. Kleda - Moistening
6. Shoshana - Drying heat
7. Vidaha - Edema associated with burning sensation
8. Raga - Redness
9. Ruk - Pain
10. Paka - Suppuration
11. Shopha - Swelling
12. Granthi Nikunchana - Formation of cysts
13. Damshavadarana - Shriveling, tearing down of flesh
14. Sphota - Boils
15. Karnika Mandala - Round, Rashes
16. Jwara - Fever.

These are the signs and symptoms of the poisonous bites, the contrary ones are found in the non-poisonous insects.

कीटविष चिकित्सा

Lepa (external application) in Kita Visha (insect bite)

After evacuating followed with different application.

क्षीरवृक्षत्वगालेपः शुद्धेकीटविषापहः ।
(च.चि. 23/199)

In insect poisoning, the Kshira VrukshaTwag Lepa (paste of the bark of the latex bearing trees) application acts as anti-poison.

मुक्तालेपोवरः शोथदाहतोदज्वरापहः ।
(च.चि. 23/199)

The paste of Mukta or Mauktika is good for alleviating Shotha (swelling), Daha (burning sensation), Toda (piercing pain) and Jwara (fever).

दशांग अगदपान

वचा हिङ्गु विडङ्गानि सैन्धवं गजपिप्पली ।
पाठा प्रतिविषा व्योषं काश्यपेन विनिमितम् ।
दशाङ्गमगदं पीत्वा सर्वकीट विषं जयेत् ॥
(अ.ह.उ. 37/27-28)

Vacha. Hingu, Vidanga, Saindhava, Gajapippali, Patha, Prativisha, Vyosha, are made into nice paste and rolled into pills this Dashanga Agada formulated by Kashyapa cures poison of all kinds of insects.

Vector borne disease

- Vector-borne diseases account for more than 17% of all infectious diseases, causing more than 700 000 deaths annually. They can be caused by either parasites, bacteria or viruses.
- Malaria is a parasitic infection transmitted by Anopheline mosquitoes. It causes an estimated 219 million cases globally, and results in more than 400,000 deaths every year. Most of the deaths occur in children under the age of 5 years.
- Dengue is the most prevalent viral infection

transmitted by Aedes mosquitoes. More than 3.9 billion people in over 129 countries are at risk of contracting dengue, with an estimated 96 million symptomatic cases and an estimated 40,000 deaths every year.

- Other viral diseases transmitted by vectors include chikungunya fever, Zika virus fever, yellow fever, West Nile fever, Japanese encephalitis (all transmitted by mosquitoes), tick-borne encephalitis (transmitted by ticks).
- Many of vector-borne diseases are preventable, through protective measures, and community mobilisation.

Vectors

Vectors are living organisms that can transmit infectious pathogens between humans, or from animals to humans. Many of these vectors are bloodsucking insects, which ingest disease-producing microorganisms during a blood meal from an infected host (human or animal) and later transmit it into a new host, after the pathogen has replicated. Often, once a vector becomes infectious, they are capable of transmitting the pathogen for the rest of their life during each subsequent bite/blood meal.

Vector-borne diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by vectors. Every year there are more than 700,000 deaths from diseases such as malaria, dengue, schistosomiasis, human African trypanosomiasis, leishmaniasis, Chagas disease, yellow fever, Japanese encephalitis and onchocerciasis.

The burden of these diseases is highest in tropical and subtropical areas, and they disproportionately affect the poorest populations. Since 2014, major outbreaks of dengue, malaria, chikungunya, yellow fever and Zika have afflicted populations, claimed lives, and overwhelmed health systems in many countries. Other diseases such as Chikungunya, leishmaniasis and lymphatic filariasis cause chronic suffering, life-long morbidity, disability and occasional stigmatisation.

Distribution of vector-borne diseases is determined by a complex set of demographic, environmental and social factors. Global travel and trade, unplanned urbanization.

List of vector-borne diseases, according to their vector

The following table is a non-exhaustive list of vector-borne disease, ordered according to the vector by which it is transmitted. The list also illustrates the type of pathogen that causes the disease in humans.

Vector	Disease caused	Type of pathogen
Mosquito <i>Aedes</i>	Chikungunya	Virus
	Dengue	Virus
	Lymphatic filariasis	Parasite
	Rift Valley fever	Virus
	Yellow Fever	Virus
	Zika	Virus
<i>Anopheles Culex</i>	Lymphatic filariasis	Parasite
	Malaria	Parasite
	Japanese encephalitis	Virus
	Lymphatic filariasis	Parasite
	West Nile fever	Virus
Aquatic snails	Schistosomiasis (bilharziasis)	Parasite
Blackflies	Onchocerciasis (river blindness)	Parasite
Fleas	Plague (transmitted from rats to humans)	Bacteria
	Tungiasis	Ectoparasite
Lice	Typhus	Bacteria
	Louse-borne relapsing fever	Bacteria
Sandflies	Leishmaniasis	Parasite
	Sandfly fever (phlebotomus fever)	Virus
Ticks	Crimean-Congo haemorrhagic fever	Virus
	Lyme disease	Bacteria
	Relapsing fever (borreliosis)	Bacteria
	Rickettsial diseases (eg: spotted fever and Q fever)	Bacteria
	Tick-borne encephalitis	Virus
	Tularaemia	Bacteria
Triatome bugs	Chagas disease (American trypanosomiasis)	Parasite
Tsetse flies	Sleeping sickness (African trypanosomiasis)	Parasite

Syllabus

1. Inorganic Acids – Sulphuric acid, Hydrochloric acid, Nitric acid.
2. Organic Acids - Oxalic acid, Carbolic acid, Formic acid.
3. Alkalies - Potassium hydroxide and Sodium hydroxide.
4. Asphyxiants – Carbon monoxide, Carbon dioxide.
5. Non-metallic poisons – Phosphorous, cyanide
6. Hydrocarbons – Kerosene.
7. Agrochemical Poisoning – Organo-phosphorus compounds, Carbamates, Organo-chlorine compounds, Aluminium phosphide.
8. Household poisons.

Learning objectives

Describe the action of poison, fatal dose, fatal period, signs and symptoms, management, post mortem appearance and medico legal aspects of :

1. Inorganic acids - Sulphuric acid, Hydrochloric acid and Nitric Acid
2. Organic acids - Oxalic acids, Carbolic acids and Formic acid Alkalies
3. Describe the action of poison, fatal dose, fatal period, signs and symptoms, management, post mortem appearance and medico legal aspects of Asphyxiants - CO and CO₂ Non-Metal – Phosphorous Hydrocarbon – Kerosene Describe the action of poison, fatal dose, fatal period, signs and symptoms, management, post mortem appearance and medico legal aspects of agrochemical poisons- organophosphorus compounds, carbamates, organochlorine compounds and aluminium phosphide and enlist the household poisons.

Total - 2 hours (Lecture :02 hour, Non-lecture: 00 hours)

MCQ- Yes- SAQ (5 Marks)- No- LAQ (10 Marks)- Yes

Classification of Poison

A. Acid poisoning

- **Mineral/inorganic acids:** sulphuric acid, nitric acid, hydrochloric acid.
- **Organic acids:** carbolic acid, oxalic acid, acetic acid and salicylic acid.

B. Alkali poisoning

hydrates and carbonates of sodium, potassium and ammonia.

1. Acid Poisoning



Acids are highly toxic, corrosive and causes injuries to human. It could be exposed either by ingestion or tissue contact through skin.

General Features

- It can be suicidal or homicidal or accidental.
- The various common acids used are formic, nitric, sulphuric, hydrochloric, carbolic, oxalic and acetic acids.

Signs and symptoms

- Burns on or around the lips
- Burning in the mouth, throat and stomach often followed by heavy vomiting.
- Diarrhoea and intense thirst.
- In severe cases patient may have unconsciousness, signs and symptoms of asphyxia, shock or seizure.

Treatment

1. Do not induce emesis.
2. Give half litre of water or milk to which milk of magnesia (50 grams) should be added.
3. If milk or water is not available then olive oil, butter, white of an egg and barley water can be given.
4. Emergency care of patient (ABC monitoring).

Inorganic Acids – Sulphuric acid, Hydrochloric acid, Nitric acid

Sulphuric Acid (H_2SO_4)

Sulfuric acid or sulphuric acid, known in antiquity as oil of vitriol, is a mineral acid composed of the elements sulfur, oxygen, and hydrogen, with the molecular formula H_2SO_4 .

Properties

1. It is heavy, oily, colourless, odourless and non-fuming liquid.
2. It is hygroscopic and carbonizes organic substances.

Fatal dose: 5 to 10 ml

Fatal period: 12 to 18 hours.

Signs and symptoms

1. Severe pain on contact
2. Severe burns and tissue damage
3. Vomiting with blood
4. Skin burning, drainage and pain
5. Eye burning, drainage and pain, may cause vision loss
6. Bluish skin, Lips and nails
7. Coughing, Chest pain, breathing difficulty and shortness of breath.
8. Rapid pulse and rapid fall down of blood pressure.

Treatment

1. Flush with water, if contact on skin or eyes.
2. A thick paste of magnesium oxide or carbonate application.
3. Antibiotics
4. Dressing of wound later on.

Postmortem appearance

1. Corrosion of chin, oral cavity including tongue and throat.
2. Corrosion on hand may also be found.
3. Teeth chalky white.
4. The colour of corroded area appear brownish or blackish.
5. Perforation in stomach in severe poisoning.

Medico legal aspects

1. Corrosive acids are commonly used for vitriolage.
2. Accidental poisoning may occur in laboratory and in children
3. Rarely used for suicide or homicide.
4. Acids are sometimes used as abortion.

Vitriolage (acid attack) involves an intentional act of violence in which any corrosive is thrown onto the face and body of a person with the intention of disfiguring them. The most common type of corrosive used in these attacks is sulfuric acid (oil of vitriol) hence the name "vitriolage". Sulfuric acid is a strong acid/corrosive and has a

toxic nature that is capable of causing bodily injuries leading to damage to mucous membranes, tissues and skin with blindness, burning, and scars often leading to significant disfigurement with temporary or permanent disability. The main reasons for acid attacks are marriage refusal, rejection of love proposals, dowry issues and male aggression. Acid attacks have horrendous physical, social, psychological and economic effects on victims.

Hydrochloric acid (HCL)

Synonyms

Muriatic Acid, Spirit of Salts

Properties

1. Colourless, odourless, volatile, fuming liquid
2. May acquire yellowish tinge when exposed to air.

Fatal dose: 15 to 20 ml.

Fatal period: 18 to 30 hours.

Signs and symptoms

1. Does not stain mucous membrane but in strong doses it corrodes mucous membrane.
2. Perforation is rare.
3. Great irritation to respiratory tract on fume inhalation.
4. Shock.

Treatment

1. ABC maintenance
2. Remove the clothing & flush the skin, hairs and eyes with water.
3. Do not induce emesis.
4. To swallow 4-8 ounces of water or milk.
5. Support of respiratory and cardiovascular functions.

Postmortem appearance

1. The skin or mucous membrane shows corrosion.
2. The skin may be brownish discoloured and parchment like.

3. Coagulation of the surface of the tongue and the mucosa of pharynx and oesophagus is seen.
4. Stomach is soft, oedematous, congested, and desquamated or may be ulcerated.
5. Stomach contents - mixed altered blood with mucus.
6. Inflammation and edema of respiratory passage.

Nitric acid (HNO₂)

Synonyms

Aqua Fortis, Red Spirit of Nitre

Properties

1. It is clear, colourless and fuming liquid having pungent odour.
2. It gives yellowish discolouration with organic substances.

Fatal dose: 10 to 15 ml.

Fatal period: 12 to 24 hours.

Signs and symptoms

- Lips, tongue and mucous membrane of mouth first softened and white later on become yellow.
- Teeth become yellow.
- Abdominal pain, distended and tender abdomen.
- Irritation and damage of eye, dyspnoea and constriction of throat when fumes inhaled.

Treatment

1. Give milk or water.
2. Give 4-6 ounces of milk of magnesia.
3. On inhalation five fresh air, oxygen inhalation.
4. ABC support.

Postmortem appearance

1. Corrosion of skin, angle of mouth, lips, mucosa with yellowish discolouration.
2. Stomach wall is soft and friable, ulcerated.
3. Perforation is less common.

Organic Acids - Oxalic acid, Carbolic acid, Formic acid

An organic acid is an organic compound with acidic properties. The most common organic acids are the carboxylic acids, whose acidity is associated with their carboxyl group $\sim\text{COOH}$. Sulfonic acids, containing the group $\sim\text{SO}_2\text{OH}$, are relatively stronger acids. Alcohols, with $\sim\text{OH}$, can act as acids but they are usually very weak. A few common examples include: Lactic acid, Acetic acid, Formic acid, Citric acid, Oxalic acid, Uric acid, Malic acid, Tartaric acid, Butyric acid, Folic acid, Carbolic acid and formic acid.

Oxalic acid ($\text{C}_2\text{H}_2\text{O}_4$ $12\text{H}_2\text{O}$)

Oxalic acid is an organic acid with the systematic name ethanedioic acid. It is the simplest dicarboxylic acid. It is a white crystalline solid that forms a colourless solution in water. Its name comes from the fact that early investigators isolated oxalic acid from flowering plants of the genus *Oxalis*, commonly known as wood-sorrels. It occurs naturally in many foods. Excessive ingestion of oxalic acid or prolonged skin contact can be dangerous.

Synonyms

Salts of Sorrel, Acid of Sugar

Properties

- Colourless, transparent, odourless, prismatic crystals resembling the crystals of magnesium sulphate and zinc sulphate.
- It has sour and slightly bitter acidic taste.
- It is present in rhubarb leaves, beets and many other vegetables.
- Potassium oxalate, sodium oxalate and ammonium oxalate are toxic salts of oxalic acid.

Fatal dose: 15 to 20 gm

Fatal period: 1 to 2 hours

Mechanism of Action

- **Local:** It acts as corrosive when used in concentrated form and act as irritants when used in dilute form.

- **Systemic:** After absorption, oxalic acid combines with calcium ion and causes hypocalcemia. It also causes tubular necrosis and renal failure.

Signs and symptoms

1. Local: Corrosion of mucosa with underlying congestion. The corroded area is referred as 'scalded' in appearance.
2. Systemic
 - Vomiting and diarrhoea
 - Hypocalcaemia (**tetany**)
 - Muscle irritability, tenderness, cramps
 - Convulsions
 - Chvostek's sign positive. When tapping is done over facial nerve area, there is spasm of facial muscles.
 - Metabolic acidosis
 - Renal failure
 - Uraemia.

Treatment

1. Local exposure: Wash the affected skin with copious water
2. Gastric lavage with calcium gluconate or calcium lactate
3. Calcium gluconate intravenously
4. Symptomatic.

Postmortem appearance

1. Scalded mucosa of GIT
2. Mucous membrane of mouth, tongue, pharynx, oesophagus may be bleached and has scalded appearance
3. Kidneys show oedema, congestion with oxalate crystals in renal tubules with necrosis of proximal convoluted tubule.

Medicolegal Importance

1. Accidental poisoning - common
2. Suicidal ingestion - rare
3. Homicide.

Uses

1. Bleaching and cleansing agent

2. Ink remover
3. Rust remover
4. Metal polishing
5. Cleaning brass and copper articles

Carbolic acid (C_6H_5OH)

Phenol, or Benzenol, (also known as carbolic acid or phenolic acid) is an aromatic organic compound with the molecular formula C_6H_5OH . It is a white crystalline solid that is volatile.

Synonyms- Phenol, Hydroxy-Benzene

Properties

- Colourless, prismatic, needle-like crystals that turns pink and liquefies when exposed to air and sweetish burning taste and phenol like smell.
- Concentrated phenol is a dark brown liquid and contains impurities like cresol.
- Lysol is 50% solution of cresol in saponified vegetable oil. However, phenol is 8 times more toxic than Lysol.
- Dettol is chlorinated phenol with terpineol.
- Household phenol (sold as phenyl) contains five percent phenol in water.

Absorption, Metabolism and Excretion

1. Phenol is absorbed from skin, gastric mucosa, per rectum, per vagina and respiratory tract
2. Phenol is converted into hydroquinone and pyrocatechol and excreted in urine.

Traces are excreted by lungs, salivary glands, and skin.

Fatal dose: 2 gm crystals, 25 to 50 ml of household phenol

Fatal period: 3 to 4 hours.

Mechanism of Action

- Phenol has local as well as systemic action.
- Locally it acts as corrosive agent and when absorbed, it causes CNS depression, metabolic acidosis and renal failure.
- Carbolic acid has great penetrating power and it coagulates protein.

- Phenols have a powerful antipyretic effect similar to that of salicylates.
- Phenols and derivatives of phenols cause methemoglobinemia.

Signs and symptoms

- **Local:** When applied to skin or mucosa, it causes burning pain, numbness, tingling and anaesthesia. It causes corrosion and produce white eschar (scar), which falls off in few days leaving brown stained area.

2. Systemic:

- GIT: Burning pain followed by tingling, numbness and anesthesia. Nausea and vomiting hepatic failure.
- RS: Respiration is slow and labored.
- CNS: Headache, giddiness, unconsciousness, convulsions, coma.
- Urine: May be colourless but on exposure to air turns green due to oxidation of phenol metabolites (hydroquinone and pyrocatechol). It is known as carboluria, oliguria.
- The hydroquinone and pyrocatechol may cause pigmentation in the cornea and various cartilages, a condition known as oochronosis.

Management

- Skin: Wash with undiluted polyethylene glycol.
- Oxygen/ventilatory support.
- Intravenous fluids and vasopressors to support blood pressure.
- Ingestion: Cautious stomach wash with sodium or magnesium sulfate solution.
- Lidocaine for ventricular arrhythmias.
- Benzodiazepines for seizures.
- Treat methemoglobinemia $\bar{O}$ if methemoglobinemia is $> 30\%$, ingest Methylene blue (1-2 mg/kg). Exchange transfusion may be needed if methemoglobinemia is $> 70\%$.

Postmortem appearance

- Phenol smell.

- Corrosion of skin, at angle of mouth, chin. Corrosions are initially white but turns brown in colour.
- Splashing may be noted.
- Tongue- white and swollen.
- Mucosa of stomach is tough, white or gray, corrugated and arranged in longitudinal folds and looks leathery.
- Mucous membrane of mouth, throat, lips are sodden whitened or ash gray.
- Urine on exposure to air turns green.

Medicolegal Importance

1. Accidental poisoning.
2. Suicidal ingestion.
3. Homicide.

Uses

1. Antiseptic and disinfectant
2. Manufacture of plastic

Formic acid (HCOOH)

Formic acid is easily available in open market, because of its wide use in the rubber industry for processing of latex. Because of the easy availability, case of accidental and suicidal poisoning by formic acid are on the rise and most of them end fatally.

Properties

- Formic acid (HCOOH) is a colourless pungent liquid.
- It burns and is dangerously caustic to the skin.
- Formic acid also known as Formylic acid or Methanoic acid.
- Strongly acidic taste.
- It melts at 8.38 c and boils at 101 oC. Specific gravity of Formic Acid is 1.220.
- Toxicologically formic acid is corrosive and irritant, but relatively nontoxic when diluted. It has got strong antiseptic property and is used as a fungicide.

Fatal dose: 50-200 ml

Sign & Symptoms

1. Retrosternal burning.

2. Chest pain and abdominal pain
3. Hematemesis, haematuria.
4. Vomiting.
5. Complications : gastrointestinal perforation, respiratory distress.

Diagnosis- Tollen's test.

Treatment

1. Antidote: Fomepizole
2. Demulcents
3. Emesis contraindicated
4. Folinic acid 1 mg/kg I.V. at 4 hourly intervals for 6 doses.
5. Dialysis.

Acetic Acid

Synonyms

Ethanoic Acid, Ethylic Acid

Properties

1. Colourless, volatile liquid with pungent odour
2. Pure acetic acid is an ice-like solid below 160C, above this temperature, it is colourless liquid. The dilute form of acid is called as vinegar.

Fatal dose: 50 to 100 ml (concentrated)

Fatal period: about 48 hours.

Mechanism of Action

- Corrosive - in concentrated form,
- Irritant - in dilute form,
- Haemolysis, hemoglobinuria, renal failure, disseminated intravascular coagulation, metabolic acidosis and liver dysfunction occurs in systemic absorption causes.

Signs and symptoms

1. Perforation of oesophagus.
2. Extreme irritation of eyes and nose.
3. Shock due to myocardial infarction and massive intestinal bleeding.
4. Formation of Ketone bodies.
5. Renal failure.

Treatment

1. Flushing of skin and eyes with water in contact poisoning.
2. Give milk a milk of magnesia.
3. Proton pump inhibitors, Tranexamic acid, Antibiotics.
4. Oxygen in halation.

Postmortem appearance

- Massive liver necrosis.
- Degeneration and swelling of renal tubular epithelium.

Alkalies - Potassium hydroxide and Sodium hydroxide**Alkalis Poisoning****Properties**

- Ammonia is a colourless gas with pungent odour. It condenses to a liquid at 33.40C. The chemical formula is NH_3 .
- Ammonium hydroxide is a liquid containing about 30 percent ammonia.
- Other corrosive alkalis occur as white powder or colourless solution.

Mechanism of Action

- In concentrated form, alkali acts as corrosive and in dilute form they act as irritant.
- Strong alkali produces liquefaction necrosis and causes saponification of fats and dissolves proteins thus causing deep penetration in the tissue resulting in extensive tissue destruction.
- Production of ulcers are more common
- Oesophagus is more commonly affected than stomach resulting in stricture formation or perforation.
- Type of material ingested may result in varying degree and location of injury.

Fatal Dose

- a. Sodium carbonate -30 gm
- b. Potassium carbonate -15 gm

- c. Sodium hydroxide -5 gm
- d. Potassium hydroxide -5 gm
- e. Ammonia - 30 ml

Fatal period: 24 hours.**Signs and symptoms**

- Chemical burns of the skin (skin -grayish, soapy, necrotic areas).
- Purging, severe pain.

Inhalation

- Irritation of eyes and watering
- Cough, breathlessness
- Respiratory tract - edematous and inflamed
- Laryngeal edema or spasm may occur causing death.

Ingestion

- Caustic taste and burning pain
- Abdominal pain
- Vomiting and vomitus is alkaline in reaction
- Diarrhoea and tenesmus
- The lips, mucous membrane of oral cavity, and the tongue appears soft, swollen, bleached and boggy.
- The mucosa of GIT is swollen, soft, grayish or bleached and sloughs easily
- Oesophagus is affected commonly than stomach and results in dysphagia, drooling and hematemesis.
- Alkali induced injury of esophagus

Management

1. Local: Wash the affected area with copious water.
2. In ingestion- Milk or water (1-2 glass) may be given to dilute the alkali.
3. Assess the injury of esophagus.
4. Symptomatic treatment.

Postmortem appearance

- Ammonia like odour may be perceived.
- Mucosa of mouth, tongue, esophagus and stomach is bleached and sodden with areas of necrosis.

- Esophagus may show esophagitis or perforation.
- Pulmonary edema.
- Inhalation - laryngeal edema.
- Skin application - chemical burns.

Potassium hydroxide

Synonyms : Caustic Potash, Lye, Potassium Hydrate

Chemical Name : Potassium Hydroxide (KOH)

- Potassium Hydroxide is an odourless, white or slightly yellow, flaky or lumpy solid which is often in a water solution.
- It is used in making soap, as an electrolyte in alkaline batteries and in electroplating, lithography and paint and varnish removers

Symptoms

- Potassium Hydroxide can affect when inhaled and by passing through the skin.
- Potassium Hydroxide is a Highly Corrosive Chemical and contact can severely irritate and burn the skin and eyes leading to eye damage.
- Exposure to Potassium Hydroxide can cause headache, dizziness, nausea and vomiting.
- Contact can irritate the nose and throat.
- Inhaling Potassium Hydroxide can irritate the lungs. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema).
- Potassium Hydroxide may cause a skin allergy.

Treatment

- Eye Contact : Quickly brush off excess chemical from the face. Immediately flush with large amounts of water for at least 30 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing.
- Skin Contact : Quickly remove contaminated clothing. Immediately blot or brush off excess chemical and wash gently with large amounts of soap and water for at least 30 minutes.

- ABC Care
- Fluid through IV line.
- Surgical removal burned skin

Sodium hydroxide

Synonyms : caustic soda, lye, soda lye, and sodium hydrate.

Features

- Sodium hydroxide is a white, non-combustible solid that absorbs moisture from the air. When the solid is in contact with water, it may generate sufficient heat to ignite combustible materials. The solid and its solutions are corrosive.
- Sodium hydroxide is odourless; thus, odour provides no warning of hazardous concentrations.

Toxicity

- Sodium hydroxide is strongly irritating and corrosive. It can cause severe burns and permanent damage to any tissue that it comes in contact with. It causes hydrolysis of proteins, and hence can cause burns in the eyes which may lead to permanent eye damage.
- Inhaled sodium hydroxide can cause swelling of the larynx and an accumulation of fluid in the lungs.

Symptoms

- Stridor, vomiting, drooling, and abdominal pain are early symptoms of sodium hydroxide ingestion. Ingestion may lead to perforation of the gastrointestinal tract and shock.
- Sodium hydroxide does not produce systemic toxicity; its health effects are due to its corrosive nature.

Management

1. Clothing is removed and the skin is washed.
 2. IV fluid
 3. Respiratory and cardiovascular support
- There is no antidote for sodium hydroxide.

Asphyxiants – Carbon monoxide, Carbon dioxide

An asphyxiant gas, also known as a simple asphyxiant, is a nontoxic or minimally toxic gas which reduces or displaces the normal oxygen concentration in breathing air. Breathing of oxygen-depleted air can lead to death by asphyxiation (suffocation). Because asphyxiant gases are relatively inert and odourless, their presence in high concentration may not be noticed, except in the case of carbon dioxide (hypercapnia).

Carbon monoxide

Properties

1. It is colourless, odourless, tasteless, non-irritant gas.
2. It is lighter than air.
3. Soluble in water.
4. Burns with blue flame.

Sources

- Fire
- Incomplete combustion of carbon/fuel such as wood, charcoal, kerosene etc.
- Automobile exhaust
- Tobacco smoke
- Generates in gun-powder, mines and detonation of explosive.

Carbon monoxide reacts 200 times more tightly with haemoglobin than oxygen and causes anaemic type of hypoxia. Signs and symptoms of CO poisoning depends upon the percentage of haemoglobin, which has been saturated with CO.

- 0-10% - None
- 10-20% -Breathlessness on moderate exertion, headache, weakness.
- 20-30% -Throbbing headache, irritability, defective memory, rapid fatigue.
- 30-40% -Nausea, vomiting, dizziness, dimness of vision, confusion, cherry red colour.
- 40-50% -Increasing confusion, ataxia, rapid respirations and collapse with attempts at

exertion. Symptom resemble alcohol intoxication.

- 50-60% -Coma with intermittent convulsions, tachycardia with weak pulse and red discoloration of skin.
- 60-70% -Increasing depth of coma with incontinence of urine and faeces.
- 70-80% -Profound coma with absent reflexes, thread pulse, shallow respirations and death.
- >80% -Rapid death from respiratory arrest.

Management

1. Remove patient from vitiated environment
2. Oxygen administration - hyperbaric oxygen
3. Benzodiazepines for convulsion
4. Physical activity curtailed to minimize the incidence of cerebral demyelination
5. Mannitol for cerebral edema.

Postmortem appearance

1. Pinkish coloration of skin and mucosa
2. Pinkish colour postmortem lividity
3. Blisters may present on dependent parts such as calves, buttocks, wrist, knee
4. Froth at mouth and nostrils
5. Features of asphyxia
6. Blood-pinkish red and fluid
7. Internal organs-pinkish red
8. Pulmonary edema
9. Petechial haemorrhages in white matter and putamen
10. Necrosis of basal ganglia especially globus pallidus.

Medico-legal importance

1. Accidental death
2. Suicide

Carbon Dioxide

Properties

- Atmosphere contains about 0.04 percent
- Heavy, odourless, colourless gas
- In solid form called as 'dry snow'

Source

1. Combustion
2. Respiration
3. Decomposition of organic matter
4. Mine explosions
5. Manholes, wells, soil or cellar

Signs and symptoms

Headache, dizziness, confusion, nausea, vomiting, dyspnoea, disturbances of vision, tachycardia, increase heart rate, blood pressure, vasoconstriction, convulsions, paralysis of respiratory centre.

Management

1. Administer oxygen
2. Supportive measures.

Postmortem appearance

1. Cyanosis
2. Froth at mouth and nostrils
3. Congestion
4. Petechial haemorrhages
5. Dark fluid blood
6. Venous engorgement

Medicolegal importance

Accidental deaths-worker working in deep well, dampen pit, overcrowding in ill ventilated room etc.

Hydrogen sulphide**General Features**

- Colorless, heavy, inflammable gas
- Rotten egg like smell
- Hydrogen sulfide, carbon dioxide and methane gases are formed in sewers and called sewer gas.

Sources

1. Formed during decomposition of organic substances containing sulfur
2. Found in sewer, cesspool, privy vaults.

Mechanism of action

It acts as a cytochrome oxidase poison,

blocking the electron transport chain that catalyzes the reduction of molecular oxygen to water.

Fatal Dose : 1000 to 3000 p.p.m.

Signs and symptoms

- Breathlessness, cough, nausea
- Giddiness, lacrimation, photophobia, keratoconjunctivitis
- Muscular weakness
- CNS depression, delirium, convulsions, coma
- Death.

Management

1. Shift the patient from vitiated environment
2. Protect airway
3. Oxygen administration
4. Intravenous fluid and vasopressors
5. Treat pulmonary oedema with furosemide
6. Supportive measures.

Postmortem appearance

1. Signs of asphyxia
2. Rotten egg like odour
3. Postmortem lividity is greenish blue due to partial formation of sulfhemoglobin.
4. Blood and viscera-greenish-purple.
5. Petechial haemorrhage.
6. Evidence of respiratory irritation in form of erosion of mucosa.
7. Lungs are congested and oedematous.
8. Liver-shows greenish-gray or ashen tint due to post-mortem combination of hydrogen sulfide and methemoglobin.
9. Urine thiosulfate and serum sulfhemoglobin levels can be determined.

Medico-legal importance

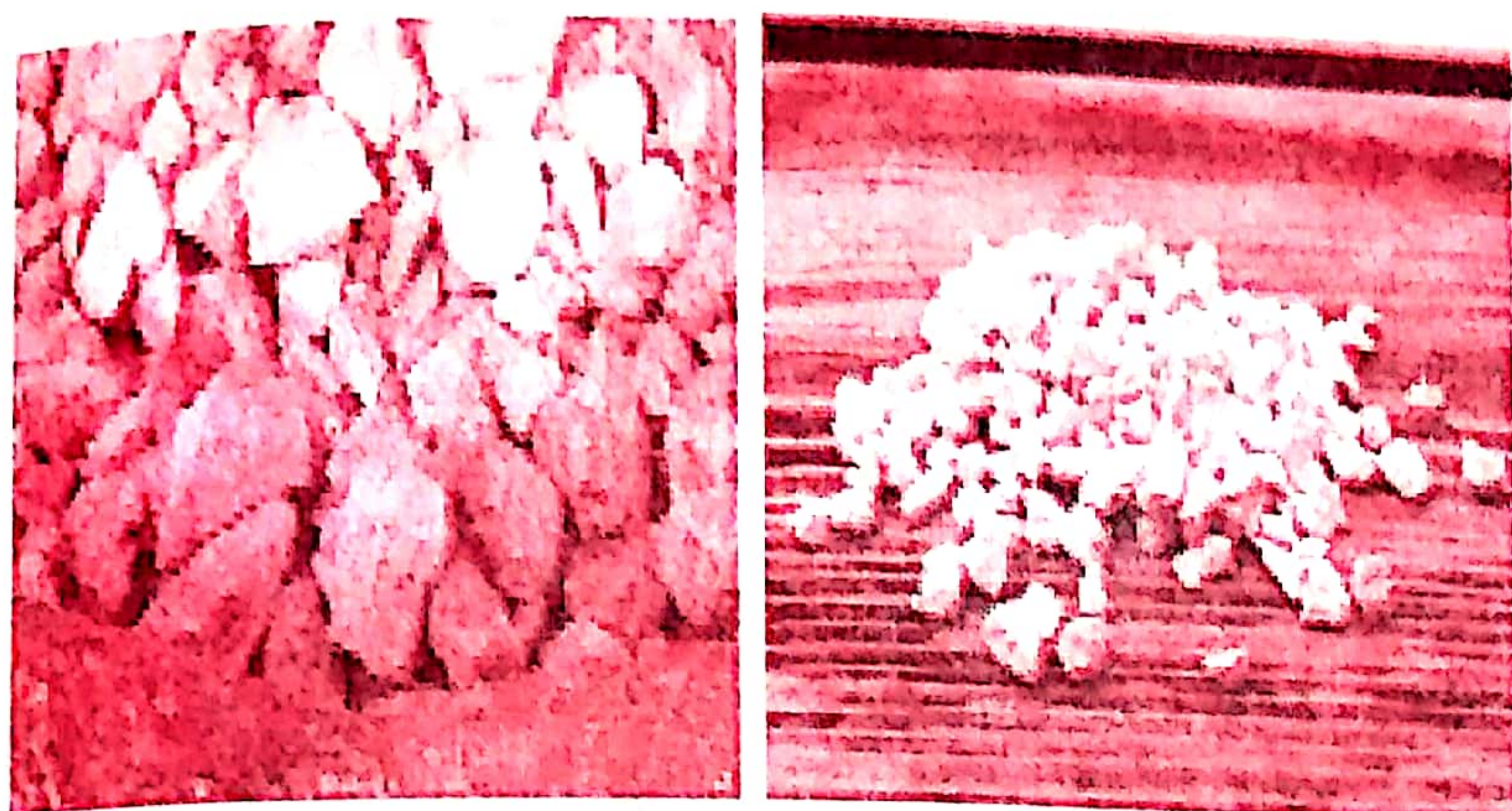
1. Accidental deaths
2. Occupational hazard for workers working in sewer tanks etc.
3. Putrefaction is rapid.

Non-metallic poisons – Phosphorous, cyanide

Non-metallic poisons are substances that can be toxic to living organisms but do not contain metal elements in their composition. These poisons

can have various chemical structures and properties, and they may affect the body in different ways.

Phosphorus Poisoning



Variety

1. White or yellow phosphorus - protoplasmic poison and affects cellular oxidation
2. Red phosphorus

Fatal dose: 60 to 120 mg

Fatal period: 4 to 10 hours.

Mechanism of Action

- Hepatotoxic and cardiotoxic
- It causes fatty infiltration and necrosis of liver and kidney
- In local application it causes severe irritation or burn injuries of skin and mucosa.

Absorption, metabolism and excretion

- Phosphorus is absorbed quickly when stomach contains fatty food.
- After absorption, it is distributed to all organs where it is retained and metabolized to hypophosphate. The hypophosphate is excreted through urine and small part is excreted unchanged through faeces and expired air.

Signs and symptoms

A. Acute poisoning: Three stages occurs over a period of 8 to 10 days.

1. First stage:

- Acute irritation of GIT with vomiting, diarrhoea and abdominal pain.
- Garlicky odour, vomitus and stool may be luminous in the dark.

2. Second stage:

- Symptoms may subside

3. Third stage:

- Symptoms of first stage re-appear with increased severity.
- Tender and enlarged liver, jaundice, hepatic failure, pruritis, encephalopathy, convulsions and renal failure

B. Chronic poisoning: Occurs due to long term exposure

- Nausea, vomiting, diarrhoea, eructation and abdominal discomfort
- Initially there is toothache in caries tooth with swelling of gums. There is loosening of teeth, sloughing of gums followed by necrosis, sequestration and osteomyelitis of mandible.
- Wasting and weakness of muscle
- Anemia,
- Jaundice
- Phossy jaw or glass jaw (osteomyelitis of lower jaw) due to chronic phosphorus poisoning.

Treatment

1. Do not give milk or oily or fatty food or drink because it will enhance the absorption of phosphorus.
2. Gastric lavage with potassium permanganate (1:5000).
3. Intravenous fluid support, blood transfusion if needed
4. Vitamin K
5. Calcium gluconate for hypocalcemia
6. Benzodiazepines for convulsions.

Postmortem appearance

1. Petechial haemorrhages
2. Jaundice
3. Garlicky odour of gastric content
4. Gastric mucosa is yellowish or greenish-white in colour and is softened
5. Gastric contents emits luminous in dark

6. Liver is enlarged, doughy in consistency, uniformly yellow and contains many hemorrhagic areas in parenchyma
7. Heart, kidneys and voluntary muscle fibers shows fatty degeneration
8. On microscopy, hepatocellular necrosis and cholestasis are seen.

Medicolegal Importance

1. Accidental poisoning
2. Suicidal or homicidal poisoning

Methyl Isocyanate Poisoning

General Features

- Colourless liquid with pungent sweetish smell below 270C
- Becomes gas at 390C
- Highly volatile and inflammable

Mechanism of action

Causes carbamylation at biochemical level.

Signs and symptoms

- Inhalation
- Lacrimation, irritation of eyes, blurring of vision, photophobia, corneal ulceration
- Cough, dyspnea, chest pain, hemoptysis, pulmonary oedema
- Convulsions, coma
- Death.

B. Dermal -erythema, vesication.

Management

1. Decontamination of skin and eyes
2. Oxygen administration
3. Bronchodilators and steroids
4. Supportive measures.

Postmortem appearance

1. Signs of asphyxia
2. Pulmonary oedema
3. Cerebral oedema
4. Visceral congestion

5. In delayed death-degeneration of brain, heart, lung, liver and kidneys.

Medico-legal importance

1. Accidental death
2. It was involved in Bhopal tragedy that occurred in 1984 causing more than 2000 deaths.

Uses

1. Manufacture of carbamate pesticide-carbaryl
2. Manufacture of adhesive
3. Manufacture of plastics

Cyanide Poisoning

Properties

- Very lethal poison
- Used as inhalation or ingestion

Signs and symptoms

- Headache, dizziness
- Nausea, hypotension
- Dyspnoea, drowsiness
- Convulsions, Cyanosis
- Unconsciousness
- Foam in the mouth
- Respiratory failure
- Characteristic smell of bitter almonds

Treatment

- Start resuscitation immediately
- Antidote : Amylnitrite + Sodium nitrite + Sodium thiosulphate
- Supportive measures.

Hydrocarbons – Kerosene

The term hydrocarbon refers to an organic chemical compound that is composed exclusively of hydrogen and carbon atoms. Hydrocarbons are naturally-occurring and form the basis of crude oil, natural gas, coal, and other important energy sources. They are highly combustible and produce carbon dioxide, water, and heat when they are burned. As such, hydrocarbons are highly effective as a source of fuel.

Kerosene poisoning

Signs and symptoms

- Burning sensation in the mouth and pharynx, nausea and vomiting.
- Giddiness, blurred vision, pale or cyanosed face, dyspnoea, drowsiness deepening to stupor, coma and death. The pupils constricted then dilated.
- Mild tachypnoea and coughing to dyspnoea, cyanosis and pulmonary oedema.

Diagnosis- Chest X-rays (aspiration pneumonia)

Fatal Dose- Ingestion of more than 10 ml of kerosene

Fatal Period - few hours

Treatment

1. Suction the secretions from the airways.
2. Oxygenation, evaluation and maintain the ventilatory status of the patient.
3. Stomach wash is contraindicated due to the risk of aspiration.
4. Liquid paraffin and smashed banana - it delays absorption.
5. Antibiotics
6. Corticosteroids

Post-mortem appearances

1. There may be acute gastroenteritis,
2. Odour of the material may be observed in the contents of the stomach and lungs.
3. Pulmonary oedema and bronchopneumonia are present.
4. Degenerative changes in the liver and kidneys.
5. Other signs of asphyxia may be seen.

Medico-legal importance

1. Kerosene is occasionally used for suicidal purposes.
2. Homicidal (dowry deaths).
3. Accidental poisoning in young children.

4. Persons exposed to the petrol fumes for a long time suffer usually from polyneuritis, damaged liver and bone marrow depression.
5. Worker in petroleum distilleries are often found to suffer from skin eruptions.

Agrochemical Poisoning

Agrochemical poisoning refers to the harmful effects on humans, animals, or the environment resulting from exposure to agricultural chemicals. Agrochemicals include a broad range of substances used in agriculture to enhance crop production, protect crops from pests and diseases, and manage weeds. These chemicals can be classified into different categories, such as pesticides, herbicides, fungicides, and fertilizers. Exposure to agrochemicals can occur through various routes, including ingestion, inhalation, and skin contact.

Organo-phosphorus compounds

Properties

- Used as pesticides and insecticides in agriculture and homes eg. TEPP, HETP, OMPA, Parathion etc.
- Very lethal
- Used in suicidal and homicidal purpose

Fatal dose :

- Melathion -60 gm
- TEPP -100 mg
- OMPA -175 mg
- HETP- 350 mg

Fatal Period : 24 Hrs.

Signs and symptoms

- Characteristic smell
- Nausea and vomiting
- Pain in abdomen, diarrhoea
- Lacrimation, sweating and bronchial secretions
- Blurring of vision
- Pin-pointed pupil
- Cramps
- Confusion, convulsions, coma

Cause of death

- Respiratory failure
- Cerebral hypoxia
- Hyperthermia
- Hepatic & renal failure

Treatment

1. Remove contaminated clothing
2. Wash the skin with soap and water
3. Give plenty of water
4. Artificial respiration
5. Resuscitation
6. Antidote administration : Atropine sulphate 2mg i.v/10 minute upto atropinization
7. Supportive measures : Oxygen ventilators, vital management

Post-mortem appearance

1. Insecticide like smell
2. Frothy month and nostrils
3. Cyanosis
4. Constricted pupils
5. Stomach content have insecticidal smell
6. Congestion of organs
7. Pulmonary and cerebral oedema
8. Toxic myocarditis

Medico-legal importance

1. Accidental poisoning
2. Suicidal poisoning
3. Homicidal poisoning

Carbamate Poisoning**Carbamates: Aldicarb and methomyl**

- Organophosphates and carbamates are common insecticide ingredients.
- They inhibit cholinesterase activity, causing acute muscarinic manifestations (e.g. salivation, lacrimation, urination, diarrhoea, emesis, bronchorrhea, bronchospasm, bradycardia, miosis) and some nicotinic symptoms, including muscle fasciculations and weakness.

- Neuropathy can develop days to weeks after exposure.

Features

Organophosphates and carbamates, although different structurally, both inhibit cholinesterase activity. Some are used medically to reverse neuromuscular blockade (e.g. neostigmine, pyridostigmine, edrophonium) or to treat glaucoma (echothiopate), myasthenia gravis (pyridostigmine), and Alzheimer disease (tacrine and donepezil).

Some organophosphates were developed as nerve agents for use in warfare. One, sarin, has been used by terrorists. Organophosphates and carbamates are commonly used as insecticides.

Those most often implicated in human poisoning include :

- Carbamates: Aldicarb and methomyl
- Organophosphates: Chlorpyrifos, diazinon, dursban, enthion, malathion, and parathion

Organophosphates and carbamates are common causes of poisoning and poisonrelated deaths worldwide.

Pathophysiology

Organophosphates and carbamates are absorbed through the gastrointestinal tract, lungs, and skin. They inhibit plasma and red blood cell (RBC) cholinesterase, preventing breakdown of acetylcholine, which then accumulates in synapses. Carbamates are cleared spontaneously within about 48 hours after exposure. Organophosphates, however, can irreversibly bind to cholinesterase.

Symptoms**1. Acute**

- Muscarinic cholinergic symptoms: Salivation, lacrimation, urination, defecation, vomiting, pinpoint pupils (miosis), bronchorrhea and wheezing, bradycardia.
- Nicotinic cholinergic symptoms: Mydriasis, tachycardia, weakness and fasciculations, sweating, abdominal pain

2. **Delayed-** Weakness, particularly of proximal, cranial, and respiratory muscles, may develop

1 to 3 days after exposure to organophosphates or rarely carbamates despite treatment (the intermediate syndrome); these symptoms resolve in 2 to 3 weeks.

Diagnosis

- Muscarinic toxidrome with prominent respiratory findings, pinpoint pupils, muscle cramping, and weakness.
- RBC cholinesterase levels

Treatment

- Supportive therapy
- Atropine for respiratory manifestations
- Decontamination and drug use :
 1. Decontamination is pursued as soon as possible after stabilization. Caregivers should avoid self-contamination while providing care. For topical exposure, clothes are removed, and the body surface is flushed thoroughly. For ingestion within 1 hour of presentation, activated charcoal can be used. Gastric emptying is usually avoided. If done, the trachea is intubated beforehand to prevent aspiration.
 2. Atropine is given in amounts sufficient to relieve bronchospasm and bronchorrhea rather than to normalize pupil size or heart rate. Initial dosage is 2 to 5 mg IV (0.05 mg/kg in children); the dose can be doubled every 3 to 5 minutes as needed. Grams of atropine may be necessary for severely poisoned patients.
 3. Pralidoxime (2-PAM) is given after atropine to relieve neuromuscular symptoms. 2-PAM (1 to 2 g in adults; 20 to 40 mg/kg in children) is given over 15 to 30 minutes IV after exposure to an organophosphate or carbamate because, frequently, whether the poison is an organophosphate or carbamate is unknown at the time of treatment. An infusion can be used after the bolus (8 mg/kg/h in adults; 10 to 20 mg/kg/h in children).
 4. Benzodiazepines are used for seizures.

Prophylactic diazepam may help prevent neurocognitive sequelae after moderate to severe organophosphate poisoning.

Organo-chlorine compounds

Chlorinated hydrocarbon (organochlorine) insecticides, solvents, and fumigants are widely used. The toxicity of organochlorine (OC) pesticides varies according to their molecular size, volatility, and effects on the central nervous system. In general, they cause either CNS depression or stimulation, depending upon the agent and dose.

Fatal dose- 5-6 gms

Fatal Period- one hour to several hours

Signs and symptoms

Initial effect

- CNS excitation and depression, typically abrupt in onset.
- Initial euphoria with auditory or visual hallucinations and perceptual disturbances
- Seizures
- Agitation, lethargy, or unconsciousness

Other signs and symptoms may present:

Cough, shortness of breath, skin rash, nausea, vomiting, diarrhoea, and abdominal pain, headache, dizziness, or paraesthesia's of the face, tongue, and extremities

Ingestion produces the following manifestations:

- Nausea and vomiting
- Confusion, tremor, myoclonus, coma, and seizures
- Respiratory depression or failure
- Unusual odour - Toxaphene may have a turpentine-like odour; endosulfan may have a sulfurous odor

Skin absorption or inhalation produces the following manifestations:

- Ear, nose, and throat irritation
- Blurred vision
- Cough
- Acute lung injury

- Dermatitis
- Long-term occupational exposure to organochlorine pesticides may result in various nonspecific symptoms, including headaches, nausea, fatigue, muscle twitching, and visual disturbances. In addition, chronic exposure to these agents may be associated with the development of blood dyscrasias, including aplastic anemia and leukemia in humans (inconclusive).
- Other manifestations of chronic exposure are as follows: Anorexia, hepatotoxicity, renal toxicity, CNS disturbances, skin irritation.

Diagnosis

1. History taking :most important
2. Laboratory investigations: RBS, Sr. electrolyte, KFT, LFT, ABG analysis, Lactate, CPK
3. Electrocardiography

Treatment

1. Supportive care and observation for signs of end-organ damage (eg, CNS, heart, lung, liver).
 2. No specific antidotes are available for organochlorine poisoning.
 3. Decontamination of poisoning, for dermal decontamination, remove clothing and wash skin with soap and water.
 4. Admit the patient to Intensive care unit ABC care with proper drug administration
 5. Multiple-dose activated charcoal (MDAC) : it may enhance faecal elimination by interrupting the biliary-enterohepatic and enteroenteric circulation of the toxin. Cholestyramine may be used to bind these highly lipophilic agents.
- Post-mortem appearance
 - Insecticide like smell
 - Stomach content have insecticidal smell
 - Congestion of organs

Medico-legal importance

1. Accidental poisoning
2. Suicidal poisoning

3. Homicidal poisoning

Aluminium phosphide

Aluminium phosphide poisoning is poisoning that occurs as a result of excessive exposure to aluminium phosphide (ALP), which is readily available as a fumigant for stored cereal grains and sold under various brand names such as Quick Phos, Salphos and Celphos. Aluminium phosphide is highly toxic, especially when consumed from a freshly opened container. Acute aluminium phosphide poisoning (AAIPP) is a large though under-reported problem throughout the world, particularly in the Indian subcontinent.

Fatal dose : 0.15 and 0.5 grams, inhalation-400-600 ppm concentration.

Fatal period- one hour to 4 days

Signs and Symptoms

After ingestion, toxic features usually develop within a few minutes. The major lethal consequence of aluminium phosphide ingestion is profound circulatory collapse, and is reportedly secondary to these toxins generated, which lead due to direct effects on cardiomyocytes, fluid loss, and adrenal gland damage.

The signs and symptoms are non-specific, dose dependent and evolve with time passing.

Dizziness, Fatigue, Tightness in the chest, Headache, Nausea, vomiting, diarrhoea, Ataxia, numbness, paraesthesia, Tremor, muscle weakness, Diplopia and Jaundice.

If severe inhalation occurs, the patient may develop acute respiratory distress syndrome (ARDS), heart failure, arrhythmias, convulsion and coma. Late manifestation includes liver and kidney toxicities.

Diagnosis

1. History taking (rice tablets may be reported by attendants)
2. Silver nitrate test on gastric aspirate.

Mechanism of toxicity

The toxicity of aluminium phosphide is attributed to the liberation of phosphine gas, a

cytotoxic compound that causes free radical mediated injury, inhibits vital cellular enzymes and is directly corrosive to tissues.

Treatment

1. Supportive therapy
2. Use of $MgSO_4$

Household poisons

DDT (Dichloro Diphenyl Trichloroethene)

Direct exposure of DDT is highly toxic if inhaled, swallowed or absorbed to skin.

Signs and symptoms

- Nausea, vomiting, vertigo, tremors
- Convulsions
- Coma
- Respiratory failure

Treatment

- Give plenty of tap water
- Induce vomiting
- Supportive treatments: oxygenation, ventilators, vital management.

Household poisons- Household poisons are poisoning that occur by exposure to home products, especial happened by children (because they don't know it is, or mimickers to adults) and by adult (accidental, mistakes). Over 90% of toxic exposure to household products occur in children under 5 year and usually at time when product is in use rather than storage.

Route of poisoning

- Ingestion or inhalation
- Skin contact

Classification

- Medicines
- Cosmetics products
- Cleaning products
- Pesticides
- Paints
- Hydrocarbons

Household Bleaches

1. Chlorine based bleaches

- contain chlorine or hypochlorite
- general disinfectant and bleaching agent.
- The toxicity of bleach is related primarily to the oxidizing capacity of the hypochlorite ion and the pH of the solution

2. Non-chlorine bleaches

- Used in numerous household products, including disinfectants, chlorine free bleaches, fabric stain removers, contact lens disinfectants, hair dyes and tooth whitening products
- May contain hydrogen peroxide, sodium perborate, sodium percarbonate

3. Hydrogen Peroxide- Colourless, odourless, acidic oxidizing agent available in a variety of concentrations from 3 to 90%

- General purpose disinfectants 3%
 - Hair bleach and hair dyes 6%
 - Contact lens disinfectants 3%
 - Chlorine free bleach 6%
 - Fabric stain removers 5-15%
 - Industrial strength up to 90%
4. Automobile battery - Sulphuric acid 25-30%
 5. Toilet Bowl Cleaner (liquid)- Hydrochloric acid 10-25%, Sulfuric acid 80%
 6. Toilet Bowl Cleaner (granular)- sodium bisulphate 70-100%
 7. Metal cleaners and antirust- Phosphoric acid 5-80%, Oxalic acid 1%, Hydrochloric acid 5-25% and Chromic acid 5-20%
 8. Drain cleaners - Sulfuric acid 95-99%
 9. Common Hydrocarbon Poisoning- Thinner, Kerosene, Gasoline/Petrol and Turpentine.
 10. Colognes, perfumes, aftershave lotions, oral hygiene products and ace toner - alcohol; effects depend on the concentration and often asymptomatic but may develop slurred speech & ataxia with large ingestion.

11. Deodorants- contains aluminium and zinc: low toxicity
12. Nail polish / nail polish remover - contains acetates, acetone, toluene & aromatic hydrocarbons
13. Hair products - dyes and bleaches containing hydrogen peroxide (<3%) have low toxicity profile
14. Creams and lotions, lipstick, toothpaste - unlikely to be harmful
15. Skin whiteners - hydroquinone; in large amount may cause cyanosis and convulsions.
16. Naphthalene- nausea, vomiting, diarrhoea, headache, restlessness
17. Camphor- nausea, vomiting and Seizures
18. Paradichloro-Benzene- Most inadvertent ingestions are asymptomatic. Inhalation can cause nausea, headache and vomiting. It can also cause irritation to the eyes and nose.

Syllabus

1. Madya and Madatyaya, Alcoholism
2. Addiction - Alcohol, Bhang, Opioids, Tobacco and Digital addiction.
3. Drugs of abuse- Lysergic acid diethylamide (LSD) and 3,4-Methylenedioxy methamphetamine (MDMA).
4. Narcotic Drugs and Psychotropic Substances (NDPS) Act.

Learning objectives

1. Define Mada and describe its stages.
2. Describe the types of Madatyaya along with its management.
3. Describe mode of action, fatal dose, fatal period, signs and symptoms, management, post mortem appearance and medicolegal importance of acute ethanol poisoning.
4. Describe mode of action, fatal dose, fatal period, signs and symptoms, management, post mortem appearance and medicolegal importance of acute methanol poisoning.
5. Discuss the application of principles of Ayurveda in the management of chronic alcoholism.
6. Discuss the signs & symptoms of alcohol withdrawal with its Ayurvedic approach.
7. Discuss the signs & symptoms of withdrawal of bhang (cannabis), ahiphena/opium and its derivatives, tobacco, LSD and MDMA with its Ayurvedic approach.
8. Discuss the research updates in Ayurveda in the management of conditions due to substances of abuse.
9. Describe the NDPS Act.

Total - 7 hours (Lecture :04 hour, Non-lecture: 03 hours)

MCQ- Yes- SAQ (5 Marks)- No- LAQ (10 Marks)- Yes

मद्य निरुक्ति

‘मद्’ धातु - ‘यत्’ प्रत्यय - मद्य शब्द

मद्य परिभाषा

बुद्धि लुप्पति यदि द्रव्यं मदकारि तदुच्यते ।
तमोगुण प्रधानं च यथा मद्यसुराऽऽदिकम् ॥
(शा.पू.ख. 4/21)

Drugs possessing Tamoguna predominantly and cause derangement of the mind are called Madakari (intoxicants); for example, Madya, Sura and other alcoholic beverages.

योनिस्संस्कारनामाद्यैर्विशेषैर्बहुधा च या ।

भूत्वा भवत्येकविधा सामान्यान्मदलक्षणात् ॥

(च.चि. 24/6)

It has several varieties depending upon its specific source material, Samskara (method of preparation), nomenclature, etc. which is at the same time unique in character on account of the common features of intoxication.

मद्य गुण

लघूष्णतीक्ष्णसूक्ष्माप्लव्यवायवाशुगमेव च ।

रुक्षं विकाशि विशदं मद्यं दशगुणं स्मृतम् ॥

(च.चि. 24/30)

Madya Dasha Guna are as follows :

1. Laghu - Light
2. Ushna - Hot
3. Tikshna - Sharply acting or penetrating
4. Sukshma - Tiny
5. Amla - Sour taste
6. Vyavayi - Pervading
7. Ashu - Fast acting
8. Ruksha - Dryness
9. Vikashi - Expanding
10. Vishada - Non-slim

मद्य दोष

यथोपेतं पुनर्मद्यं प्रसङ्गाद्येन पीयते ।
रुक्षव्यायामनित्येन विषवद्याति तस्य तत् ॥
(च.चि. 24/28)

Madya act like Visha (poison) for the one who indulges in excessive drinking any kind of alcohol and possessed excessive Rukshata (excess dryness in body) and Vyayama (exhausted because of physical exercise).

मद्यं हृदयामाविश्य स्वगुणैरोजसो गुणान् ।
दशभिर्दश संक्षोभ्य चेतो नयति विक्रियाम् ॥
(च.चि. 24/29)

The Madya (liquor) affects heart by counteracting the Ojas (the vital essence of body) by its ten qualities with the ten qualities of the alcohol itself.

मद्य गुण	ओज गुण
लघु	गुरु
उष्ण	शीत
अम्ल	मधुर
तीक्ष्ण	मृदु
आशु	प्रसाद
हृक्ष	शनेह
व्यवायी	स्थिर
विकासी	श्लक्ष्ण
विशद	पिच्छिल
सूक्ष्म	सान्द्र (बहल)

अतिपीतेन मद्येन विहतेनौजसा च तत् ।
हृदयं याति विकृतिं तत्रस्था ये च धातवः ॥
(च.चि. 24/36)

The excess drinking of liquor and gradual impediment of Ojas affects the heart and the Dhātu located at the heart.

Madyapana Janita Roga

मद्ये मोहो भयं शोकः क्रोधो मृत्युश्च संश्रितः ।
सोन्मादमदमूर्च्छायाः सापस्मारापतानकाः ॥
(च.चि. 24/56)

Alcohol causes Moha (perplexity), Bhaya (phobia), Shoka (grief), Krodha (rage), Mrutyu (death) along with the Unmada (psychosis), Mada (intoxication), Murccha (loss of consciousness), Apasmara (epilepsy) and Apatanaka (spasm of tendons).

विषस्य ये गुणा दृष्टाः सन्निपातप्रकोपणाः ।
त एव मद्ये दृश्यन्ते विषे तु बलवत्तराः ॥
हन्त्याशु हि विषं किञ्चित् किञ्चिद्रोगाय कल्पते ।
यथा विषं तथैवान्त्यो ज्ञेयो मद्यकृतो मदः ॥
(च.चि. 24/98-99)

Qualities of Visha (poison) that causes the aggravation of all three Dosha are also found in the Madya (alcohol), the only difference being in Visha is these attributes are more powerful.

Some poisons are fatal with immediate effect, while other causes certain diseases. The last stage of Mada (intoxication) shall be considered as the poisonous state.

मद अवस्था (Stages of Mada)

ओजस्यविहते पूर्वं हृदि च प्रतिबोधिते ।
मध्यमो विहतेऽल्पे च विहते तूत्तमो मदः ॥
(च.चि. 24/37)

1. **Prathama Mada**- The early stage of Mada (intoxication) starts when it spreads up to the heart but Ojas is not disturbed.
2. **Madhyama Mada**- In the middle stage Ojas (vital essence) gets disturbed.
3. **Trutiya Mada**- In the later stage there is severe disturbance to the Ojas.

प्रथम अवस्था-

प्रहर्षणः प्रीतिकरः पानान्नगुणदर्शकः ।
 वाद्यगीतप्रहासानां कथानां च प्रवर्तकः ॥
 न च बुद्धिस्मृतिहरो विषयेषु न चाक्षमः ।
 सुखनिद्राप्रबोधश्च प्रथमः सुखदो मदः ॥
 (च.चि. 24/42-43)

The early-stage exhibits following features,

1. Praharshana - Exhilarating
2. Pritikara - Passion
3. Pana Anna Guna Darshana - Reflecting the qualities of the food and the drink
4. Vadya Gita Praharshanam Kathana Cha Pravartaka - Invokes instrumental and vocal music, different entrainment and narrative stories.
5. Na Cha Buddhi Smruti Haro Vashayeshu Na chakshama - Neither affects the intellect or memory, not lead to the incapability of the senses.
6. Sukha Nidra Prabodhashca - The pattern of sleep and awakening is restored and overall, enjoying the phase.

द्वितीय अवस्था-

मुहुः स्मृतिर्मुहुर्मोहो (ऽ) व्यक्ता सज्जति वाङ्मुहुः ।
 युक्तायुक्तप्रलापश्च प्रचलायनमेव च ॥
 स्थानपानान्नसांकथ्ययोजना सविपर्यया ।
 लिङ्गान्येतानि जानीयादाविष्टे मध्यमे मदे ॥
 (च.चि. 24/44-45)

In the mid stage the following features are observed :

1. Memory gets affected
2. Causes confusions
3. Distinct speech turns to indistinct
4. Relevant or irrelevant talkativeness
5. Irrelevant movements
6. Rambling postures
7. Food, drink and speech.

तृतीय अवस्था-

तृतीयं तु मदं प्राप्य भग्नदार्ढ्यं निष्क्रियः ।
 मदमोहावृतमना जीवन्नपि मृतैः समः ॥

रमणीयान् स विषयान् वेत्ति न सुहृज्जनम् ।
 यदर्थं पीयते मद्यं रतिं तां च न विदन्ति ॥
 कार्याकार्यं सुखं दुःखं लोके यच्च हिताहितम् ।
 यदवस्थो न जानाति कोऽवस्थां तां व्रजेदबुधः ॥
 स दूष्यः सर्वभूतानां निन्द्यश्चाग्राह्य एव च ।
 व्यसनित्वादुदर्के च स दुःखं व्याधिमश्नुते ॥
 (च.चि. 24/48-52)

While attaining the third stage of Mada shows following symptoms.

The individual body becomes static like a torn wood that falls down as like broken twig, mind occupied by disturbance and confusion, similar to a dead but still alive. The individual does neither identify the pleasant senses nor friends and even does not recognize the person of pleasure for which the liquor has been consumed.

Further proceeds to a stage where the identification of right or wrong, happiness or sorrow, desirable or undesirable in the universe is not recognizable. Becomes hated and non-acceptable among the people and because of addiction will consequently attain a stage of painful diseases afterwards.

युक्ति पूर्वक मद्यपान

तेषां त्रिकाणामष्टानां योजना युक्तिरुच्यते ।
 यथा युक्त्या पिबन्मद्यं मद्यदोषैर्न युज्यते ॥
 मद्यस्य च गुणान् सर्वान् यथोक्तान् स समश्नुते ।
 धर्मार्थयोरपीडायै नरः सत्त्वगुणोच्छ्रितः ॥
 (च.चि. 24/69-70)

Trikana Ashtanam Yojana (Sensible planning of the eight triads) is called as Yukti, for consumption of alcohol without causing any disorders.

The person predominant in Satva quality enjoys all the advantages of the alcohol without affecting the observance of the Dharma (virtue) and the Artha (wealth).

स्रोतोविबन्धनुन्मद्यं मारुतस्यानुलोमनम् ।
 रोचनं दीपनं चाग्नेरभ्यासात् सात्त्विकमेव च ॥
 उरःस्रोतःसु शुद्धेषु मारुते चानुलोमिते ।
 निवर्तन्ते विकाराश्च शाम्यन्त्यस्य मदोदयाः ॥
 (च.चि. 24/119-120)

The alcohol clears the Sroto Vibandha (obstruction in the Srotas), Marutasya Anuloma (helps in downward movement of Vata), Rochana (acts as an appetizer), Dipana (stimulate the Agni) gets Satmya (habituated) by regular drinking.

When the obstruction in the channels is removed and the Vata moves downwards, the pain subsides and ailments caused by Madatyaya gets cured.

मद्यपान अयोग

क्रोधिनुञ्चिताः क्षीणाः परिश्रान्ता मदक्षताः ।
स्वल्पेनापि मदं शीघ्रं यान्ति मद्येन मानवाः ॥
(च.चि. 24/87)

The person who are suffering with hunger and thirst, weak, predominant with Vata and Pitta, consuming arid, less and deficient food, harden stool, weak in psyche, wrong in getting angry, emaciated, exhausted, sore due to the intoxication, gets instantly affected by even smaller quantity of the alcohol.

Madatyaya

Symptoms

शरीरदुःखं बलवत् संमोहो हृदयव्यथा ।
अरुचिः प्रतता तृष्णा ज्वरः शीतोष्णलक्षणः ॥
शिरःपार्श्वस्थिसन्धीनां विद्युत्तुल्या च वेदना ।
जायतेऽतिबला जृम्भा स्फुरणं वेपनं श्रमः ॥
उरोविबन्धः कासश्च हिक्का श्वासः प्रजागरः ।
शरीरकम्पः कर्णाक्षिमुखरोगस्त्रिकग्रहः ॥
छर्द्यतीसारहल्लासा वातपित्तकफात्मकाः ।
भ्रमः प्रलापो रुपाणामसतां चैव दर्शनम् ॥
तृणभस्मलतापर्णपांशुभिश्चावपूरणम् ।
प्रधर्षणं विहङ्गैश्च भ्रान्तचेताः स मन्यते ॥
व्याकुलानामशस्तानां स्वप्नानां दर्शनानि च ।
मदात्ययस्य रुपाणि सर्वाण्येतानि लक्षयेत् ॥
(च.चि. 24/101-106)

Madatyaya Samanya Lakshana are as follows:

1. Sharira Dukha- Pain in the body
2. Sam Moha- Unconscious or Confusion
3. Hrudy Vyatha- Cardiac pain
4. Aruchi- Anorexia
5. Pratata Trishna - Persistent thirst

6. Shita Ushna Jwara (ज्वर क्षणे शीतं क्षणे चौष्णम्)- Fever having the characteristics of cold and heat.
7. Shirah, Parshwa Asthi Sandhi Vidyutulya Vedana- Headache, pain in flanks, arthralgia and joint pain. (विक्षते क्षते जाते वेदना तथा शिरःप्रभृति वेदना - Fractional existence of symptoms)
8. Jrumbha- Yawning
9. Sphurana (kegcheveb) - Throbbing.
10. Vepana- Tremors (वेपनमेकदेशे व्यक्तकम्पनम्)
11. Shrama- Fatigue or exhaustion
12. Uro Vibandha- Chest congestion
13. Kasa- Coughing
14. Hikka- Hiccups
15. Shwasa- Breathlessness
16. Prajagarana- Sleeplessness
17. Sharira Kampa- Trembling
18. Karna Akshi Mukha Roga- Disorders of ear, eye, mouth
19. Trika Graha- Sacral stiffness
20. Chardi- Vomiting
21. Atisara- Diarrhea
22. Hrullasa- Nausea with symptoms of Vata, Pitta, Kapha
23. Bhrama- Giddiness
24. Pralapa- Delirium
25. Rupana Cha Mastanama Cha Darshana- Hallucinations
26. Trina Bhasma Lata Parna Pashubhi Avapurana- Self covered by grass, ash, creeper, leaves, and dust.
27. Pragharshana Vihnga - Perverted mind feels assaulted by birds
28. Bhranta Cheta- Visualizing fear
29. Vyakulanam Ashastana- Inauspicious dreams.

सामान्यं लक्षणं तेषां प्रमोहो हृदयव्यथा ।
विड्भेदः सततं तृष्णा सौम्याग्नेया ज्वरोऽरुचिः ॥
शिरःपार्श्वस्थिरुक्कम्पो मर्मभेदस्त्रिकग्रहः ।
ज्वरो विबन्धस्तिमिरं कासश्चासप्रजागराः ॥

स्वेदोऽतिमात्रं विष्टम्भः श्वयथुश्चित्तविभ्रमः ।
 प्रलापश्छर्दिरुत्क्लेशो भ्रमो दुःस्वप्नदर्शनम् ॥
 (अ.स.नि. 6/17-19)

Their general symptoms are severe delusion, pain in heart (or disturbance of the mind), diarrhoea, constant thirst, fever having both heat and cold (rigors), loss of appetite, pain in the head, flanks and bones; tremors (shaking), cutting pain in the vital parts, catching pain in the triangle of the back (meeting place of the shoulder, backbone and scapula), obstruction in the chest, blindness or unconsciousness, cough, dyspnoea, loss of sleep, excessive perspiration, indigestion and stasis of food inside the abdomen, for long time; swelling, disorders of the mind, irrelevant talk, vomiting excess salivation, giddiness and bad dreams.

Vataja Madatyaya Hetu

स्त्रीशोकभयभाराध्वकर्मभिर्योऽतिकर्षितः ।
 रुक्षाल्पप्रमिताशी च यः पिबत्यतिमात्रया ॥
 रुक्षं परिणतं मद्यं निशि निद्रां विहत्य च ।
 करोति तस्य तच्छीघ्रं वातप्रायं मदात्ययम् ॥
 (च.चि. 24/89-90)

Causative factors of Vataja Madatyaya are, if person is Karshita (emaciated) due to Stri (excess sexual intercourse), Shoka (grief), Bhaya (fear), Bhara (bearing heavy weight), Adhva (traveling), Ruksha (consuming dry), Alpa Pramitashi (less in quantity and deficient in quality food), Pibeta (drinks), Ruksha (dry) and Parinata Madya (older alcohol) in excess quantity at Nishi (night), Nidra Vihatya (disturbing sleep) leads to Vataja Madatyaya.

Vataja Madatyaya Lakshana

हिक्काश्वासशिरःकम्पपार्श्वशूलप्रजागरैः ।
 विद्याद्बहुप्रलापस्य वातप्रायं मदात्ययम् ॥
 (च.चि. 24/91)

Hikka (hiccups), Shwasa (breathlessness), Shira Kampa (tremors in head), Parshwa Shula (pain in flanks), Prajagara (sleeplessness) and Bahu Pralapa (frequent delirium) are the symptoms of Vataja Madatyaya.

Pittaja Madatyaya Hetu

तीक्ष्णोष्णं मद्यमलं च योऽतिमात्रं निषेवते ।

अम्लोष्णतीक्ष्णभोजी च क्रोधनोऽग्न्यातपप्रियः ॥
 तस्योपजायते पित्ताद्विशेषेण मदात्ययः ।
 स तु वातोल्बणस्याशु प्रशमं याति हन्ति वा ॥
 (च.चि. 24/92-93)

One who consumes Tikshna (sharply acting), Ushna (hot) and Amla (sour) alcohol in Atimatra (larger quantity) while consuming Amla (sour), Ushna (hot) and Tikshna (sharp) food items in diet and Krodha (angry in nature), exposure to the Agni (fire) and the Atapa (sun), gets affected with the Madatyaya predominant in Pitta. It either gets easily pacified or proves fatal in Vata dominant Prakruti persons.

Pittaja Madatyaya Lakshana

तृष्णादाहज्वरस्वेदमूर्च्छातीसारविभ्रमैः ।
 विद्याद्भरितवर्णस्य पित्तप्रायं मदात्ययम् ॥
 (च.चि. 24/94)

Trishna (thirst), Daha (burning sensation), Jwara (fever), Sweda (sweating), Murccha (fainting), Atisara (diarrhea), Vibhrama (giddiness) and Harita Varna (greenish discoloration) are the distinct features of Pittaja Madatyaya.

Kaphaja Madatyaya Hetu

तरुणं मधुरप्रायं गौडं पैष्टिकमेव वा ।
 मधुरस्निग्धगुर्वाशी यः पिबत्यतिमात्रया ॥
 अव्यायामदिवास्वप्नशय्यासनसुखे रतः ।
 मदात्ययं कफप्रायं स शीघ्रमधिगच्छति ॥
 (च.चि. 24/95-96)

Taruna (one who consumes freshly), Madhura Praya (sweet alcohol) made up of Gauda (jaggery) or Paishtika (flour in excess quantity), with Madhura (sweet), Snigdha (unctuous) and Guru (heavy) diet, Avyayama (indulging lack of exercise), Divasvapna (day sleep), reclining on bed and sitting in comfort leads to Kapha predominant Madatyaya. [95-96]

Kaphaja Madatyaya Lakshana

छर्दरोचकहृल्लासतन्द्रास्तैमित्यगौरवैः ।
 विद्याच्छीतपरीतस्य कफप्रायं मदात्ययम् ॥
 (च.चि. 24/97)

Chardi (vomiting), Arochaka (anorexia), Hrullasa (nausea), Tandra (drowsiness), Saimitya

(stiffness), Gaurava (heaviness) and Shita (sensing cold) are the features of Kaphaja Madatyaya.

Sannipataja Madatyaya Hetu

विषस्य ये गुणा दृष्टाः सन्निपातप्रकोपणाः ।
त एव मद्ये दृश्यन्ते विषे तु बलवत्तराः ॥
हन्त्याशु हि विषं किञ्चित् किञ्चिद्रोगाय कल्पते ।
यथा विषं तथैवान्त्यो ज्ञेयो मद्यकृतो मदः ॥
तस्मात् त्रिदोषजं लिङ्गं सर्वत्रापि मदात्यये ।
दृश्यते रूपवैशेष्यात् पृथक्त्वं चास्य लक्ष्यते ॥
(च.चि. 24/98-100)

Qualities of Visha (poison) that causes the aggravation of all three Dosha are also found in the Madya (alcohol), the only difference being in Visha is these attributes are more powerful.

Some poisons are fatal with immediate effect, while other causes certain diseases. The last stage of Mada (intoxication) shall be considered as the poisonous state. Therefore, symptoms of Tridosha (vitiation) are observed in all types of alcoholism, the difference among them is identified by their specific features.

मदात्यय चिकित्सासूत्र

सर्वं मदात्ययं विद्यात् त्रिदोषमधिकं तु यम् ।
दोषं मदात्यये पश्येत् तस्यादौ प्रतिकारयेत् ॥
कफस्थानानुपूर्व्या च क्रिया कार्या मदात्यये ।
पित्तमारुतपर्यन्तः प्रायेण हि मदात्ययः ॥
(च.चि. 24/107-108)

All types of Madatyaya Tridoshaja, therefore, the Dosha observed predominantly affected shall be treated initially.

The treatment of Madatyaya shall begin with the site of Kapha, because Kapha Dosha predominantly situated involved than Pitta and Vata.

Vataja Madatyaya Chikitsa

Vata obstructed in Srotas due to Dosha vitiated by alcohol causes Vedana Tivra Shirasyasthi (intense pain in head, bones and joints). In such condition for dissolving Dosha, specific alcohol should be administered since it has quality of Vyavayi (quick absorption), Tikshna (sharpness) and Ushna (hot) in spite of other remedial measure.

The alcohol clears the Sroto Vibandha (obstruction in the Srotas), Marutasya Anuloma (helps in downward movement of Vata), Rochana (acts as an appetizer), Dipana (stimulate the Agni) gets Satmya (habituated) by regular drinking.

When the obstruction in the channels is removed and the Vata moves downwards, the pain subsides and ailments caused by Madatyaya gets cured.

The meat of fatty animals advised for Vataja alcoholics not too Snigdha (unctuous) and Amla (sour), processed with Maricha and Ardraka (fresh ginger) or with Dadima Rasa, Trijataka individual and Dhanyaka (coriander seed), Maricha and Ardraka (fresh ginger) are consumed as thick soup with warm Pupa.

If Trishna (thirsty) associates after consumption of food then Varuni Manda, Dadima Rasa, boiled and cooled Panchamula Siddha Jala (water) with Panchamula, Dhanyaka, Ardraka, Dadhi Manda, Amlakanji (froth of sour gruel), Shuktodaka are given to the person. Undergoing this regimen as per the involved Dosha and Kala, the disorders get pacified and Bala (strength) and Varna (complexion) get enhanced.

Pathya in Vataja Madatyaya- Vata predominant Madatyaya usually gets controlled immediately by various regimens.

1. Aharaja - Intake of meat preparations, Shaka (vegetables), Pishtanna (flour preparations), Yava (barley), Godhuma (wheat), Shali mixed different types of Ragas and Shadava.

2. Viharaja - Abhyanga (massage), Utsadana (anointing), Snana Ushna (hot baths), Pravarana Ghana (thick blankets), Ghana or Bahala, Agaru (thick Agaru pastes), Dhupa Agaru (thick essence of Agaru), Narina Yauvana Ushna (affectionate hug to women to the bosom with warmth of youthfulness), Rupa Gruhana Shroni Uru Kuchabhara Samrodhosha Sukhavaha (pleasant touch of their hips, thighs, breasts due to fondling), Shayana Achadana Ushna Anta Gruha Sukha (warm bedding and covered with warm comfortable home).

Pittaja Madatyaya Chikitsa

In Pittaja Madatyaya, administer Shita (cool), well suitable alcohol prepared of Sharkara, Mrudvika (dried grapes) added with Sharkara (sugar) and juice of Bhavya or Auttarapathika Kharjura, Mrudvika or Mrudvika Rasa and Parushaka or along with the Dadima mixed with Saktu (roasted grain flour) after diluting with large quantity of water.

The diet to be consumed such as the meat of Shasha (rabbit), Kapinjala (grey partridge), Ena (black deer), Lava (common quail), Asita Puchhaka or Kalapuccha (a type of deer), Madhura (sweet) and Amla (soured) along with Shali and Shashtika.

The soup of meat of goat is prepared with Patola or the soup of Satina or Vartula Kalaya and Mudga mixed with Dadima and Amalaki.

Similarly different types of Trapana (refreshing drink), Yusha (soup) and Rasa (meat soup) are added with Draksha, Amalaki Kharjura and Parushaka is advisable.

In Pittaja Madatyaya if Kapha and Pitta vitiated at Amashaya (stomach), then considering the state of excess aggravation leading to Daha (burning) and Trishna (thirst), the alcohol or Draksha Rasa (grapes juice) or Toya (water) or Tarpana shall be advised to induce complete Vamana (emesis). This will relieve the illness rapidly.

Pathya in Pittaja Madatyaya- Pitta predominant Madatyaya controlled by following regimens.

1. Ahara - Shita Annapana (cold food and drinks), Shita Shayyasana (cool residence), Shita Vata Jala Sparsha (exposure to cool air and water, cool gardens and the touch of cool linen), Kshaumapadma Utpala (hued lotus, water lily), Mani Mautika (pearl), Chandana Udaka Shita Sparsha (sandal wood cold water touch), Hema (golden), Rajata (silver), Kasya (bronze) vessels with Shita Vari (cold water), Hima Purnana Pavanahata (breeze and ice bags) Samsparsha Chandanardana Nari (touch of women bathed with sandal water) and Samaruta Chandana (cool breeze from sandal trees) are advised in Pittaja Madatyaya.

Whatever is Shita Virya dominant shall be used.

Kumuda (Feel of lotus leaves), Utpala (water lily), Sikta (gravel), Chandanambu (sandal water) is beneficial in alcohol induced Daha (burning sensation).

2. Vihara- Katha (stories), Vividha Shasta Shabda Shikhi (variety of pictures, pure tone of voice of peacock), sound of clouds reduce the impact of Mada (intoxication).

Physician shall conceptualize the Jala Yantrabhi Varshani (showers of cool water), Vata Yantra Vahani (air conditioning for cool air) and Dhara Ghruha (sprinkling cabinets) for treating Daha (burning sensation) in alcoholism.

Kaphaja Madatyaya Chikitsa

- Ullekha or Vamana (emesis) and Upavasa (fasting) can successfully treat Kaphaja Madatyaya.
- Water boiled with Hribera, Bala, Prishniparni, Kantakari are boiled and cooled water, with these Nagara (dry ginger) is given in Trishna (thirst) due to Kaphaja Madatyaya.
- Water boiled with Duralabha and Musta or Musta and Parpataka or only Musta which metabolizes the Vipachana (toxins) shall only be used for Pana (drinking) in all types of Madatyaya. This is harmless and pacifies Trishna (thirst) and Jwara (fever).

Ahara Dravya in Kaphaja Madatyaya

Food prepared of Yava (barley) or Gaudhumaka (wheat) added with Ruksha Yusha, Kulattha or Shushka Mulaka. This vegetable soup is Tanu (thin), Alpa (small in quantity), Laghu (light for digestion). It is added with Katu (pungent) Amla (sour) ingredients and Sarpi (ghee) in small quantity.

- Sour soup of Patola, soup of Amalaka added with several Katu Samyukta (pungent) shall be given with Yava (barley) food.
- In the same way, soured soup of Trikatu or soup mixed with Amlavetasa, soup of Chaga (goat) or soured meat soup of Jangala animals shall be given.

- Meat roasted in a plate or in an earthen plate without adding any liquid and added with Katu (pungent), Amla (sour) and Lavana (salt) shall be consumed along with Madhu (a type of alcohol).
- Meat roasted while adding Maricha, Matulunga Rasa, other Katu pungent in proper needed quantity, Yavani and Nagara (dry ginger) and Dadima Sara (souring with pomegranate) consumed with Ushna Pupa and plenty of Ardraka (fresh ginger) pieces by considering the Agni in proper time followed by drinking alcohol cures Kaphaja Madatyaya.
- Ashtanga Lavana Prayoga in Kaphaja Madatyaya.
- Raga Prayoga in Kaphaja Madatyaya

Sannipataja Madatyaya Chikitsa

- This regimen is described here according to individual Dosha involvement. The same with permutation and combinations can be applied by physician in other ten types of Sannipataja (mixed variety of Dosha aggravation) condition.
- The one who understands Dosha Vikalpa (permutations and combinations of Dosha), Aushadhi (medicines) and Sadhyasadyata (prognosis) can differentiate between Sadhya (curable) and Asadya (non-curable) diseases and treat.

Harshana Chikitsa in Madatyaya

Alcohol cannot lead to Mada (intoxication) without distressing Mana (mind) and affecting the Sharira (body), therefore Harshana Chikitsa (exhilaration treatment) by above measures shall be adopted to stabilize mind and body.

The following Harshana measure provides relief from Madatyaya

1. Vana Ramaniya - Beautiful gardens
2. Sapadma Salila - Ponds with lotus flowers
3. Vishadan Anna Pana - Good food and drinks
4. Sahaya - Pleasing companion

5. Malya - Garlands
6. Gandha Yoga - Perfumes,
7. Vasasi Vimala - Clean clothing
8. Gandhrva Shabda - Melodious music
9. Kanta Gishtha Hrudaya Priya - Pleasing and delight companies
10. Sakatha Hasya Gita - Liberal stories, jokes, singing
11. Priya Nari - Beloved submissive women.

Kshira Prayoga in Madatyaya

In case Madatyaya does not get pacified with these explained regimens by adopting different methods of alcohol consumption, Kshira (milk) shall be prescribed. With withdrawal of alcohol, when Kapha is diminished, than debility and quickness occurs due to Langhana (fasting) and purifying Dosha Shodhana, alleviating measures and Vata Pitta get dominant in the person with alcohol, the Kshira (milk) acts as a boon as like the rains for the tree in intense summer.

When the disease is reduced by the use of Kshira (milk) further Bala (strength) is regained. The use of Kshira (milk) shall be discontinued and alcohol consumption can be resumed in smaller quantities gradually.

ध्वंसक and विक्षय

ध्वंसक लक्षण

श्लेष्मप्रसेकः कण्ठास्यशोषः शब्दासहिष्णुता ।
तन्द्रानिद्रातियोगश्च ज्ञेयं ध्वंसकलक्षणम् ॥

(च.चि. 24/201)

The following are the Dhwanasaka Lakshana:

1. Shleshma Praseka - Excess salivation
2. Kanthasya Shosha - Dehydrated throat and mouth
3. Shabda Asahishnuta - Intolerance to sound
4. Tandra - Excess drowsiness
5. Nidra - Sleepiness.

विक्षय लक्षण

हृत्कण्ठरोगः संमोहश्छर्दिरङ्गरुजा ज्वरः ।
तृष्णा कासः शिरःशूलमेतद्विक्षयलक्षणम् ॥

(च.चि. 24/202)

The following are the Vikshaya Lakshana. It occurs in Kshina (debilitated) and Krusha (emaciated) person.

1. Hrud Kantha Roga - Cardiac disorders and throat disorders
2. Samoha - Confusions
3. Chardi - Vomiting
4. Anga Ruja - Body ache
5. Jwara - Fever
6. Trishna - Thirst
7. Kasa - Cough
8. Shira Shula - Headache.

ध्वंसक and विक्षय चिकित्सा

तयोः कर्म तदेवेष्टं वातिके यन्मदात्यये ।
तौ हि प्रक्षीणदेहस्य जायेते दुर्बलस्य वै ॥
बस्तयः सर्पिषः पानं प्रयोगः क्षीरसर्पिषोः ।
अभ्यङ्गोद्वर्तनस्नानान्यन्नपानं च वातनुत् ॥
ध्वंसको विक्षयश्चैव कर्मणाऽनेन शाम्यति ।
युक्तमद्यस्य मद्योत्थो न व्याधिरुपजायते ॥
(च.चि. 24/203-205)

The management of Dhwasmsaka and Vikshaya are similar to the management of Vataja Madatyaya. Basti, Sarpi (consumption of ghee) and Kshira (milk) with Sarpi (ghee), Abhyanga (massage), Udvartana (power massage), Snana (bath), Vatahara Annapana (suitable food and drink are Vata pacifying. Dhwasmsaka and Vikshaya subside by this regimen. The drinking disorders will not occur in the person who drinks alcohol by following proper methods.

Addiction

Alcohol poisoning

Signs and symptoms

- Smell of alcohol
- Vomiting, convulsions
- Inco-ordination
- Visual impairment
- Rapid pulse
- Shallow breathing
- Smell of alcohol
- Slurred speech
- Double vision
- Flushing of face
- Dilated pupils

Treatment

- Give water, milk or white of egg
- Induce vomiting
- Vital maintenance

Methanol (Methyl Alcohol) Poisoning

- Methanol is highly toxic alcohol. It is metabolized to formaldehyde (by alcohol dehydrogenase) and formic acid (by acetaldehyde dehydrogenase). It can be present in contaminated country liquor used to denature ethanol.
- It is accumulation of formic acid which causes toxic effects in methanol poisoning. Accumulation of formic acid results in lactic acidosis metabolic acidosis with low plasma bicarbonates.
- Symptoms of poisoning are nausea, vomiting, dizziness, confusion, headache, abdominal pain, respiratory depression, cyanosis, acute tubular necrosis, hypothermia, fixed dilated pupils, visual disturbance (blurring of vision; photophobia) and odor of spirit in breath.
- Fatal dose in adults is 60-240 ml, but as little as 15 ml can cause blindness.
- Methanol poisoning can be treated by supportive measures, gastric lavage and sodium bicarbonate (to treat acidosis).
- Ethanol is useful because it competitively inhibits the conversion of methanol to formic acid. Fomepizole can also be used as it is specific inhibitor of alcohol dehydrogenase.
- Folic acid or folinic acid enhance the metabolism of formic acid to CO₂. Hemodialysis may also be used in severe poisoning.

Ethyl Alcohol (Ethanol poisoning)

The term 'alcohol' in popular use refers to ethyl alcohol (ethanol). Alcohol abuse can cause (i) alcohol intoxication, (ii) alcohol withdrawal and (iii) chronic complications.

(A) Acute intoxication

Ethyl alcohol depresses the CNS irregularly in

descending order from cortex to medulla. Acute alcohol intoxication has following stages :

1. **Stage of excitement** : This is due to depression of inhibitory centers. There is feeling of well being and euphoria.
2. **Stage of incoordination** : There is incoordination of thoughts, speech and action which manifest as impaired judgement, confusion, slurred speech and staggering gait. Pupils are dilated.
3. **Stage of narcosis** : There is deep sleep, rapid pulse, hypothermia.

Fatal Dose : 150-250 ml of absolute alcohol consumed in an hour is fatal

B) Withdrawal symptoms

The most common withdrawal syndrome is hangover on next morning. Other common symptoms include tremors, nausea, vomiting, insomnia, restlessness, anxiety, irritability, alcoholic seizures (rumfits), alcoholic hallucinosis, and delirium tremens.

C) Chronic complications

1. **Wernicke-Korsakoff syndrome** : It is due to thiamine deficiency. Wernicke's encephalopathy is acute reaction, while Korsakoff's psychosis is chronic syndrome due to thiamine deficiency. Wernicke's encephalopathy is characterized by classical triad of global confusion, ophthalmoplegia, and ataxia. Korsakoff's psychosis is characterized by amnesia with confabulation.
2. **Marchiafava-bignami disease (MBD)** : There is epilepsy, ataxia, spastic paralysis, hallucinations and impaired intellectual functions.
3. **Others** : Depression, suicide, anxiety disorders, morbid (pathological) jealousy, dementia and psychosis.

Tests for alcohol

For alcohol in blood and tissues : Widmark's formula.

For alcohol blood and urine levels : (i) Alcohol dehydrogenase (ADH) method, (ii) Gas

chromatography (most specific), (iii) Kozelka and hine test, (iv) Cavett test, and (v) Breath analysis/ drunkometer (it is screening method, based on Henry's law).

Tobacco



It is prepared from cured leaves of *Nicotina tabacum*.

Toxic principles: Nicotine, nornicotine

Nicotine is colorless, volatile, bitter and hygroscopic liquid.

Toxic part: tobacco leaves

Uses

1. Smoking tobacco
2. Chewing
3. Snuff
4. Insecticide

Mechanism of Action

1. Nicotine receptors present in autonomic ganglia, adrenal medulla, central nervous system, spinal cord, neuromuscular junction and
2. Chemo-receptors of carotid and aortic bodies.

Absorption, Metabolism and Excretion

- Absorption - from skin, mucous membrane and lungs
- Metabolism - in liver
- Excretion - via urine and milk.

Fatal Dose-

- 40 to 60 mg of nicotine

- 15 to 30 gm of crude tobacco

Fatal period- 5 to 15 minutes

Tobacco poisonous features

(A) Acute Poisoning

1. Nausea and vomiting, diarrhoea, pain in abdomen
2. Salivation
3. Anxiety, headache, blurred vision, confusion
4. Tachycardia followed by bradycardia
5. Convulsions, paralysis, coma

(B) Chronic Poisoning

1. Found in nicotine addiction and common among smokers, tobacco chewers.
2. Develops physical dependence, manifested by recurrent craving for tobacco, tolerance, cough, impaired memory and amblyopia.
3. Tobacco withdrawal is manifested by change in mood, insomnia, restlessness, constipation, headache and anxiety.

Complications

- Carcinoma of lung, oesophagus, mouth, larynx
- Smokers cough, bronchitis
- Thromboangiitis obliterans
- Tobacco amblyopia

Maternal Smoking causes

- Increased risk of spontaneous abortion
- Fetal death
- Increased frequency of abruptio placentae or placenta previa
- Low birth weight baby

Management

1. Gastric lavage with activated charcoal
2. Benzodiazepines for convulsions
3. Symptomatic treatment.

Postmortem appearance

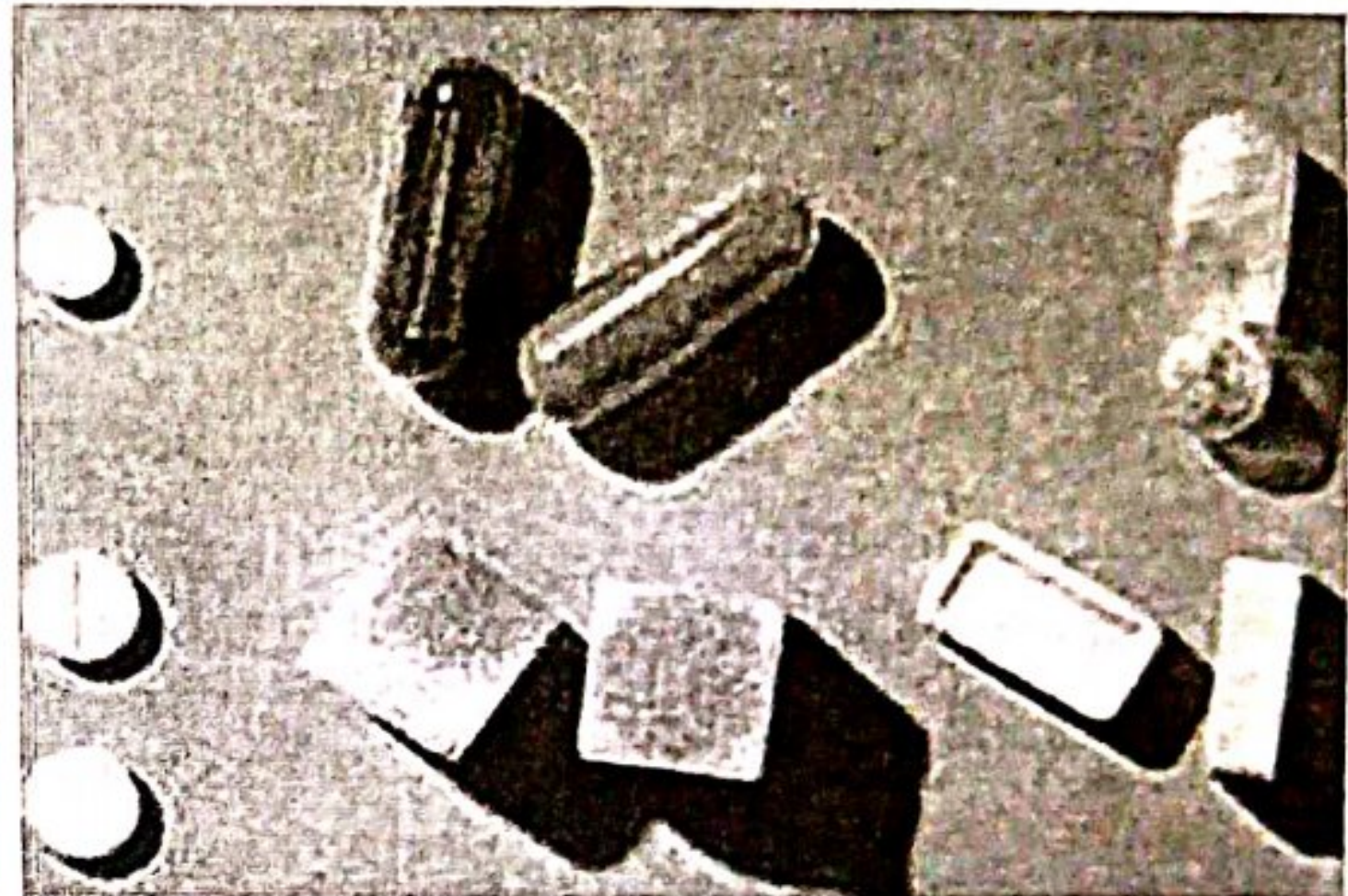
1. Brownish stains may present over skin
2. Brownish froth at mouth and nostrils
3. Signs of asphyxia

- Tobacco smell may present
- Brownish discoloration of esophagus and gastric mucosa
- Stomach may contain fragments of tobacco leaves
- Pulmonary edema

Medicolegal Importance

1. Accidental poisoning may occur due to overdose
2. Occupational hazard
3. Malingering to induce illness
4. Suicidal or homicidal

Lysergic acid diethylamide (LSD)



These are the drugs which are commonly abused in 'rave parties' for their euphoric and hallucinogenic properties. The drugs are-

- Lysergic acid diethylamide (LSD), a hallucinogen and one of the most potent psychoactive compounds.
- The drug is odorless, colorless, and slightly bitter tasting. It is usually taken by mouth and is rapidly absorbed by the gastrointestinal (GI) tract.
- Very small dose 1-1.5 mcg/kg can produce psychoactive effects; an oral dose of 25 g is capable of producing potential deleterious psychedelic effects.
- LSD in several different pill forms.

LSD is a narcotic drug with no known acceptable medical use that has a high potential for

abuse, and the possession of any amount of LSD is illegal.

It causes a potential health hazard. Severe LSD toxicity can lead to respiratory arrest, coma, emesis, hyperthermia, autonomic instability, and bleeding disorders. In some cases, the patient's altered perceptions can result in behavioural toxicity, in which an individual fails to appreciate dangers in the environment and may be injured.

Signs and symptoms

1. Psychomimetic symptoms

Adverse effects of LSD use can include the following:

- Panic reaction - May be triggered by an unexpected stressful setting
- Amplification of unconscious fears
- Self aggression
- Suicidal or homicidal ideation
- Fear of going insane or of the inability to return to normal
- Perception of rapid aging of self or others
- Profound depression

2. Somatic symptoms

Somatic symptoms of LSD toxicity, which are usually due to sympathomimetic effects, include the following:

- | | |
|--|--------------------|
| • Mydriasis | • Hypertension |
| • Tachycardia | • Flushing |
| • Sweating | • Loss of appetite |
| • Nausea | • Diarrhoea |
| • Dry mouth | • Drowsiness |
| • Sleeplessness | • Weakness |
| • Paraesthesia | • Tremors |
| • Hyperactive reflexes | • Piloerection |
| • Mild pyrexia | |
| • Seizures - Rare; typically, with doses above 10 mcg/kg | |

3. Massive overdoses can lead to the following:

- Respiratory arrest

- Intracranial haemorrhage
- Cardiac arrhythmias
- Coma - Very rare
- Emesis
- Hyperthermia
- Autonomic instability
- Coagulopathies
- Rhabdomyolysis
- Seizures

LSD has been found to be responsible for triggering serotonin syndrome in patients already using precipitating drug combinations (serotonin precursors or agonists, serotonin-release stimulators, selective serotonin reuptake inhibitors

[SSRIs], nonselective serotonin-reuptake inhibitors, nonspecific inhibitors of 5-HT metabolism).

Diagnosis

1. Primarily by way of history and physical examination,
2. LSD can be detected by radioimmunoassay levels from 1.5-5.5 ng/mL may be found within 24 hours after the patient has taken a 300-mcg dose of the drug.
3. High-performance liquid chromatography or gas chromatography is required for confirmation.

Management

1. Reassurance in a calm, stress-free environment that is safe
2. Use of Sedatives
 - Benzodiazepines
 - Butyrophenones such as haloperidol
3. Physically restrained.
4. **Massive ingestions of LSD:** Need supportive care - respiratory support and endotracheal intubation if needed
5. Symptomatic treatment

Methylenedioxy Methamphetamine (MDMA)

- MDMA is commonly known as ecstasy, XTC, Adam, E, X, clarity, Stacy, Molly.
- MDMA (3,4-methylenedioxymethamphetamine) is an amphetamine derivative that gained significant popularity and became the recreational drug of choice for many adolescents and young adults.
- Individuals who take MDMA describe a sense of euphoria, loss of inhibition, a feeling of closeness and/or empathy, and increased sensuality.
- In recent years, MDMA has also entered clinical practice as part of treatment for post traumatic stress disorder.

Facts

At the root of MDMA's widespread popularity is the mistaken belief that it is a safe drug with little toxicity and a long duration of action. In fact, MDMA has addictive psychoactive properties and unpredictable toxicity, and its abuse has led to an alarming number of emergency department (ED) visits worldwide.

Patients with MDMA toxicity may present with central nervous system, cardiovascular, gastrointestinal, skin, and other manifestations. They should be evaluated for hyperthermia, dehydration, hyponatremia, seizures, hypertensive crises, cardiac dysrhythmias, and possible signs of serotonin syndrome. Most patients with MDMA overdose improve with supportive care, but life-threatening complications may result from severe toxicity.

Pathophysiology

Like other amphetamines (in particular, dopamine and norepinephrine), it causes catecholamine release from presynaptic vesicles. However, MDMA also is a selective serotonergic neurotoxin that causes massive release of serotonin (ie, 5-hydroxytryptamine [5-HT]) and is postulated to inhibit its uptake.

The effects of MDMA can be described as those of a hallucinogenic amphetamine, combining some effects of amphetamine (ie, "speed") with that of LSD (ie, "acid"). However, many of the effects are dose dependent, and auditory and/or visual hallucinations are not commonly observed. Much of the abuse potential lies in its pleasurable subjective effects (eg, empathy, euphoria, disinhibition, increased sensuality); MDMA is often described as the "hug drug," due to the amplified desire to be touched and socialize.

MDMA is available as a tablet, capsule, powder, and liquid; however, it most commonly is used in capsule or tablet form. The pure crystalline powder form of MDMA is usually sold in capsules and is popularly known as Molly (slang for "molecular"). Tablets often are engraved with various motif symbols and brands, ranging from birds (eg, doves) and animals (eg, blue elephants), numbers (eg, 8 1/2), cartoon characters (eg, Bugs Bunny), and cars (eg, Ferrari).

MDMA is usually swallowed, although reports of smoking, snorting, and injecting MDMA have been found. Users may place a crushed or powdered dose of MDMA in a small piece of soft paper (eg, toilet paper) and swallow it—so-called parachuting—to speed onset of the drug's effect. Following oral intake, the duration of action is 8–24 hours with a half-life of 12–34 hours, though this can depend on the purity of the drug ingested.

About 75% is excreted unchanged by the kidneys; the rest is metabolized in the liver.

Repeated doses cause sympathomimetic responses to predominate and can result in amphetamine-like toxicity. Severe hyperthermia has been reported at doses of 4–5 mg/kg.

Substances found mixed with MDMA have included heroin, ketamine, and ephedrine (ie, herbal ecstasy).

Adverse effects of MDMA

The acute effects of MDMA have an initial onset of 30 minutes after oral intake and are

characterized by anxiety, tachycardia, and elevated blood pressures. Associated symptoms include diaphoresis, bruxism, jaw clenching, paresthesias, dry mouth, increased psychomotor activity, and blurred vision. Within 1 hour, these sympathomimetic effects are replaced by feelings of relaxation, euphoria, and increased empathy and communication. While overt auditory and/or visual hallucinations are uncommon, patients report increased sensory tactile enhancement and mild visual distortions, such as halos. These effects plateau for up to 90 minutes and then diminish over 3-4 hours.

Symptoms:

- a. Central nervous system manifestations include the following:
 - Change in mental status, seizures
 - Anxiety, paranoia
 - Increased psychomotor activity, restlessness
 - Hyperthermia, hot flashes
 - Headache
 - Ataxia
 - Blurred vision, halos
 - Syncope
- b. Cardiovascular manifestations include the following:
 - Palpitations
 - Chest pain
- c. Gastrointestinal manifestations include the following:
 - Dry mouth
 - Nausea, vomiting
 - Abdominal cramping
 - Anorexia
- d. Skin manifestations include the following:
 - Diaphoresis
 - Piloerection
- e. Other manifestations include the following:
 - Urinary retention, difficulty voiding
 - Sexual dysfunction

- Dental - Bruxism (jaw clenching) is frequently observed in MDMA users; it results in enamel erosion and dental decay, with consequent tooth fracture and gum recession.

Sign

- a. Head, ears, eyes, nose, and throat findings include the following:
 - Mydriasis
 - Nystagmus
 - Decreased visual acuity
 - Bruxism (i.e., teeth grinding)
 - Trismus, jaw clenching
 - Eroded enamel
 - Dry mouth
- b. Central nervous system findings include the following:
 - Hyperthermia
 - Increased psychomotor agitation
 - Hypervigilance
 - Agitation, anxiety
 - Ataxia
 - Hallucinations (very rare)
- c. Cardiovascular findings include the following:
 - Tachycardia
 - Dysrhythmias
 - Hypertensive crisis
- d. Respiratory findings include the following:
 - Respiratory distress (rare; such patients are usually polysubstance abusers)
 - Respiratory failure, aspiration, noncardiogenic pulmonary edema
- e. Other findings include the following:
 - Diaphoresis
 - Abdominal cramping
 - Muscle spasm
 - Sexual dysfunction (difficulty having orgasm)
 - Urinary retention

Management of MDMA toxicity

1. Decontamination with activated charcoal/sorbitol
2. Sedation with benzodiazepines in agitated and anxious patients
3. Relief of muscle spasms and/or cramping with benzodiazepines
4. Prevention of rhabdomyolysis with IV fluids

(benefit of furosemide or sodium bicarbonate remains controversial)

5. Seizure control with benzodiazepines
6. Stabilization of hemodynamic and/or cardiovascular disturbances with nitroprusside or nitroglycerin.

NDPS Act- explanation about this in 26 chapter.

Syllabus

1. Toxic carcinogens
2. Toxicities due to chemo and radiotherapy and its Ayurvedic approach.
3. Agada and Visha Dravya Prayoga in the prevention and management of cancer along with its research updates.

Learning objectives

1. Discuss the concepts of Agada Tantra in oncology.
2. Enlist the cancer-causing toxic chemicals / substances (toxic carcinogens) and describe the process of mutation in genes and carcinogenesis.
3. Describe the chemotherapy induced common toxicities and Ayurvedic approach for its management.
4. Describe the radiotherapy induced common toxicity and Ayurvedic approach for its management.
5. Discuss the role of Visha and Vishaghna Dravya in the management of cancer along with its research updates.

Total - 6 hours (Lecture :02 hour, Non-lecture: 04 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

Toxic carcinogens

According to the World Health Organization, cancer is a dangerous and frightening disease which is the second leading cause of death in the 21st century. Cancer is described as a tumor in Ayurveda, which includes different types of tumors, their symptoms and treatment etc. In the present context, the figures of oral cancer, uterine cancer, breast cancer etc. are increasing day by day.

This disease is causing economic burden and long-term impact on the affected person as well as his family and society. In such a situation, we have to understand how to prevent and treat it effectively.

According to modern medical science, abnormal and abnormal growth of cells is the cause of cancer. The concept of Gara Vish and Dushi Vish under Agad Tantra in Ayurveda can be compared with various sources of exposure to toxic substances through our daily life. These toxic substances cause disorders like cancer, stroke, heart

disease, skin diseases in the body. In the context of Agada Tantra, prevention and therapeutic study of these poisons and their use can make an important contribution in diseases like cancer.

Inanimate, living and other artificial poisons which partially enter the body and irritate the body's defects, irritate the body cells. Due to the low potency of these poisons, they do not cause immediate death, but if they remain in the body for a long time, they contaminate the blood and the metals and in the modern context become carcinogens for cells and tissues, which is the root cause of disease. Toxic poison contaminates the blood and produces symptoms like Aaru, Kitibha and Kotha.

Similarly, Viruddha Ahara highlights the defects and remains in the body and is opposed to Dhatu. These age and any other defects, along with the elevated factors, have adverse effects on various organs and cells, which can cause cancer.

Viruddha Ahara produces Ama Visha, this Ama Visha contaminates the Raktadi Dhatu and is a carcinogen. Apart from this, in the description of the causes of tumors in Ayurveda, Mithya Ahara Vihara (wrong eating habits) and common poisons have been considered as the initial causes. In the treatment of tumors also, Ama Pachana, Langhana, Pachana and Shodhana etc. are described.

Excessive use of fertilizers and pesticides used in agriculture, chemicals used in other industries and chemicals used in cosmetics is currently the cause of cancer. In Ayurveda, it has medicinal value in the form of Gara and Dushi poison. These Ayurvedic subjects have comparative and practical importance in the context of cancer.

Arbuda

निदान an सम्प्राप्ति

.....सम्पूर्च्छिता मांसमभिप्रदूष्य ।
वृत्तं स्थिरं मन्दरुजं महान्तमनल्पमूलं चिरवृद्ध्यपाकम् ॥
कुर्वन्ति मांसोपचयं तु शोफं तदर्बुदं शाधीविदो वदन्ति।
(सु.सं.नि. 11/13-14)

Aggravated dosas causing vitiation of the muscle tissue, produce muscular swelling, anywhere in the body which is round, static (immovable) with mild pain, big in size, deep rooted, growing slowly and not ripening (forming pus) this disease is called as Arbuda by those learned in the science.

भेद

आचार्य चरक - 6 भेद - वातज, पित्तज, कफज, मेदोज, सिराज and मांसज

आचार्य सुश्रुत - 6 भेद- वातज, पित्तज, कफज, रक्तज, मांसज and मेदोज

अर्बुद लक्षण

The Doshas having vitiated in any part of the body and afflicting the Mamsa, and produce a swelling, which is circular, fixed, slightly painful, big in size, broad based, slowly growing and does not suppurate.

रक्तार्बुद

दोषः प्रदुष्टो रुधिरं सिरास्तु सम्पीड्य सङ्कोच्य गतस्तु पाकम् ।

सास्त्रावमुन्नहति मांसपिण्डं मांसाङ्कुरैराचितमाशु वृद्धिम् ॥
स्त्रवत्यजस्रं रुधिरं प्रदुष्टमसाध्यमेतद्गुधिरात्मकं स्यात् ।
रक्तक्षयोपद्रवपीडितत्वात् पाण्डुर्भवेदर्बुदपीडितस्तु ॥
(सु.सं.नि. 11/13-14)

Aggravated Dosha associating with blood and getting localised in the vein (blood vessels), produce squeezing and contraction in them, and give rise slight ripening (forming pus) or no ripening; make a ball of muscle, which exudes, bulges up, covered with sprouts of muscle, increasing in size quickly exuding vitiated blood continuously; this Rakta Arbuda (produced by blood), is incurable; the person suffering from this disease, because of having secondary diseases due to loss of blood, becomes a patient of Pandu Roga (anaemia).

मांसार्बुद

मुष्टिप्रहारादिभिरर्दितेऽङ्गे मांसं प्रदुष्टं प्रकरोति शोफम् ।
अवेदनं स्निग्धमनन्यवर्णमपाकमश्मोपममप्रचाल्यम् ॥
प्रदुष्टमांसस्य नरस्य बाढमेतद्भवेन्मांसपरायणस्य ।
मांसार्बुदं त्वेतदसाध्यमुक्तं साध्वेष्वपीमानि विवर्जयेत्तु ॥
(सु.सं.नि. 11/18-19)

At the place on the body hit by the fist etc, the muscle there in, getting hated, gives rise to a swelling which is painless, unctuous, of the same colour of the body, not forming pus, stone like and not moveable; this occurs specially persons who have vitiated muscle and who partake meat constantly; this Mamas Arbuda is incurable.

अर्बुद अपाक कारण

न पाकमायान्ति कफाधिकत्वान्मेदोऽधिकत्वाच्च विशेषतस्तु । दोषस्थिरत्वाद् ग्रथनाच्च तेषां सर्वार्बुदान्येव निसर्गतस्तु ॥ (सु.सं.नि. 11/22)

All Arbudas (malignant tumors) by nature, do not form pus, especially because of predominance of Kapha and Medas (fat), stability of the dosas and these forming the lump (hard mass).

साध्यासाध्यता

- साध्य- वातज, पित्तज, कफज, मेदोज
- असाध्य- रक्तज, मांस, मर्मस्थान, अचल अर्बुद

Vataja Arbuda Chikitsa

Arbuda produced by Vata should be fomented

by applying warm poultice prepared from seeds of Karkaruka, Ervaruka, Narikela, Priyala, and Panchangula, similarly important poultices made from Mamsa (meat) or Vesavara (mutton broth); the skilled physician should then, administer sudation through Nadi Sveda (steam coming out from tube), remove blood in more quantity (often) using the sucking horn. Then the patient is made to drink Trivit Sneha (mixture of ghee, oil and muscle-fat) cooked a hundred times with the decoction of Vata mitigating drugs, added with milk and sour liquids (Sauviraka etc).

Pittaja Arbuda Chikitsa

In Arbuda produced by pitta, sudation, applying warm poultices and purgation to the body should be administered mildly; the tumor should be rubbed with (rough) leaves of Udumbara, Shaka and Gojihva and then a fine paste of Sarjarasa, Priyangu, Pattanga, Rodhra, Anjana (Srotonjana) Yaīka, Aragvadhā, Gojihva, Soma and Shyama mixed with honey should be applied. The patient of Pitta Arbuda and Pittodara should drink medicated ghee prepared with the juice (decoction) of Shyama, Girihva (Shvetasyanda), Anjanaki (Nilanjanika Phala), Drakīha and Saptalika (Yavatikta) added with the paste of Klitaka (Yastimadhu).

Kaphaja Arbuda Chikitsa

The patient of Arbuda produced by Kapha, should be administered purificatory therapies first; then blood letting and next applied with a poultice prepared from drugs eliminating the Dosha by upward route (emetics) and downward route (purgatives); or a poultice prepared from excreta of dove and pigeon, kamsya Nila (bronze slag), Shuka (Granthiparni) and Langalaka (kalihari), root of Kakadani and Gomutra should be applied warm on the tumor.

Kshara Prayoga

The physician should apply caustic alkali, fire (thermal cautery) and Shastra (sharp instruments) many times without any hesitation and not harming the strength of the person. Decoction of leaves of Asphota, Jati and Karavira is ideal to cleanse the

wound. After it becomes clean, oil boiled with Bharigi, Vidanga, Patha and Triphala be used (for healing). If the tumor becomes ripe on its own accord, then the physician well versed in procedure should treat it like a ripened tumor.

Medorbuda Chikitsa

Arbuda produced by Medas (fat), should be fomented first, then cut open, cleaned of the blood and sutured quickly. Then the wound is sprinkled with powder of Haridra, Grhadrhuma, Rodhra, Pattanga, Manashila and Ela, next Karanja Taila added with more of honey and should be applied to cleanse the wound.

Arbuda punarutpatti (recurrence of tumors/metastasis)

Those Arbuda (malignant tumors) in which remnants of dosa (remnants of tumor tissue) remain, they develop again quickly; hence they (malignant tumors) should be excised/removed without leaving any residue; any residue left will kill the patient just like fire (a spark of fire developing into big fire and destroying the house).

Cancer and Carcinogens

The most important risk factors are :

Age: Although people of all ages can get cancer, older people are at greater risk.

Genetics: Family history may put at risk for cancer. If someone in family had a certain type of cancer, be more at risk for that type of cancer. Genetics play a large role for many cancers, such as breast cancer and colon cancer.

Behaviours: Tobacco use and exposure to the sun or other sources of UV radiation are risk factors for cancer. Other lifestyle choices that might affect chances of getting cancer include a poor diet, lack of exercise, or heavy drinking.

Viruses or bacteria: Some cancers are caused by a virus or bacteria. Some viruses linked to cancer are the human papillomavirus (HPV), which causes cervical cancer; hepatitis B and C viruses, which can cause liver cancer; and the Epstein-Barr virus, which may cause a type of lymphoma. Also, the H. pylori bacterium can cause gastric cancer.

Exposure to chemicals: As we have discussed, being exposed to chemicals may also be a risk factor.

Toxic carcinogens

A **carcinogen** is any substance, radionuclide, or radiation that promotes carcinogenesis (the formation of cancer). This may be due to the ability to damage the genome or to the disruption of cellular metabolic processes. Several radioactive substances are considered carcinogens, but their carcinogenic activity is attributed to the radiation, for example gamma rays and alpha particles, which they emit. Common examples of non-radioactive

carcinogens are inhaled asbestos, certain dioxins, and tobacco smoke. Although the public generally associates carcinogenicity with synthetic chemicals, it is equally likely to arise from both natural and synthetic substances. Carcinogens are not necessarily immediately toxic; thus, their effect can be insidious.

Carcinogens are agents in the environment capable of contributing to cancer growth. Carcinogens can be categorized into two different types: activation-dependent and activation-independent, and each nature impacts their level and type of influence when it comes to promoting cancer growth.

Carcinogen	Occupational sources	Associated cancer sites or types
Arsenic and its compounds	- Lung - Skin - Hemangiosarcoma	- Smelting byproduct - Component of: - Alloys - Electrical and semiconductor devices - Medications (e.g. melarsoprol) - Herbicides - Fungicides - Animal dips - Drinking water from contaminated aquifers.
Asbestos	- Lungs - Asbestosis - Gastrointestinal tract - Pleural mesothelioma - Peritoneal mesothelioma	Not in widespread use, but found in: - Constructions - Roofing papers - Floor tiles - Fire-resistant textiles - Friction linings (brake pads) (only outside Europe) - Replacement friction linings for automobiles still may contain asbestos
Benzene	- Leukemia - Hodgkin's lymphoma	- Light fuel oil - Former use as solvent commodity chemical
Beryllium and its compounds	Lung	- Lightweight alloys - Aerospace applications - Nuclear reactors
Cadmium and its compounds	Prostate	- Yellow pigments - Phosphors - Solders - Batteries - Metal paintings and coatings
Hexavalent chromium (VI) compounds	Lung	- Paints - Pigments - Preservatives
Nitrosamines	Lung	Cigarette smoke

	• Esophagus • Liver	• Nitrite-treated foods (cured meats)
Ethylene oxide Nickel	• Leukemia • Nose • Lung	• Commodity chemical • Sterilant for hospital equipment • Nickel plating • Ferrous alloys • Ceramics • Batteries • Stainless-steel welding byproduct
Radon and its decay products	• Lung	• Uranium decay • Quarries and mines • Cellars and poorly ventilated places
Vinyl chloride	• Hemangiosarcoma • Liver	• Production of polyvinyl chloride
Shift work that involves circadian disruption	• Breast	
Involuntary smoking (Passive smoking)	• Lung	
Radium-226, Radium-224, Plutonium-238,	• Bone (they are bone seekers)	• Nuclear fuel processing
Plutonium-239 and other alpha particle emitters with high atomic weight	• Liver	• Radium dial manufacturing

Others carcinogen :

- Gasoline (contains aromatics)
- Lead and its compounds
- Alkylating antineoplastic agents (e.g., mechlorethamine)
- Styrene
- Other alkylating agents (e.g., dimethyl sulfate)
- Ultraviolet radiation from the sun and UV lamps
- Alcohol (causing head and neck cancers)
- Other ionizing radiation (X-rays, gamma rays, etc.)
- Low refining or unrefined mineral oils

Toxicities due to chemo and radiotherapy and its Ayurvedic approach

In modern medicine, Chemotherapy and radiotherapy are choice of treatment in cancer that are highly toxic and damage adjacent healthy cells.

The side effects after therapy may be acute, intermediate or late.

- Common side effects of chemotherapy: nausea, vomiting, diarrhea, mucositis, alopecia, constipation etc.
- Common side effect of radiotherapy : Fatigue, anorexia, nausea, vomiting, alteration in the taste, sleep disturbance, headache, anemia, dry skin, constipation etc.
- Late complications of these therapies : Pharyngitis, esophagitis, laryngitis, persistent dysphagia, fatigue, hepatotoxicity, infertility and cognitive deficits.
- The combined and latter side effects devastating effect on the quality of life of cancer patient.
- The both above therapy i.e. chemotherapy and radiotherapy not only kill cancer cell but also target other body cells. This is drawback of these therapy to harm our normal body cell that function to maintain health. In this situation

the side effect of conventional cancer therapy, Ayurveda have attracted the view of researchers and medical practitioners more recently. When the major side effects of chemo-radiotherapy are looked through an Ayurvedic perspective, it appears that they are the manifestations of aggravated pitta dosha, especially under the group of disorders called Raktapitta (haemorrhage) or Raktadushti (vascular inflammation).

Ayurveda based treatment may act as an important adjuvant to chemo-radiotherapy and enhance the quality of life of cancer patients :

1. Herbs help total healing, reduces the side effects and cancer-associated complications :

Andrographis Paniculata, Annona Atemoya, Phyllanthus Niruri, Piper Longum, Podophyllum hexandrum, Tinospora cordifolia, Semecarpus Anacardium, Vitis Vinifera, Baliospermum Montanum, Madhuca Indica, Pandanus Odoratissimum, Pterospermum Acerifolium, Raphanus Sativus, Barleria Prionitis, Prosopis Cineraria, Amorphopallus Campanulatus, Oxoxylum Indicum, Basella Rubra, Flacourtia Romantchi, Moringa Oleifera, Ficus Bengalensis, Curcuma Domestica, Allium Sativum, Calotropis Gigantea, Datura Metel, Hygrophila Spinosa, Juniperus Indica, Moringa Oleifera, Nigella Sativa, Picrorrhiza Kurroa, Rubia Cordifolia, etc. are various plants having scientific evidence of anticancer property.

2. Herbal preparations for chemotherapy rehabilitation : Pippali (Piper nigrum), Tulsi (Ocimum sanctum), Brahmi (Bacopa monnieri), Guggul (Commiphora wightii), Turmeric (Curcuma longa), Amla (Emblica officinalis) etc.

3. Use of Basti : Basti karma and its active principles that benefits and lowering the risks of adverse effects; and avoids the need for supplemental therapy to manage cancer cachexia.

Chemotherapy agents stimulate the melanocortin system in hypothalamus leads to Anorexia. Drug uses in Basti regulate normal function of brain.

4. Panchakarma : Basti Karma and other Panchkarma therapy that is applicable in all the disorder of Vata. According to Sushruta, it can also be used in Kaphaja and Pittaja disorders by using different ingredients. Vata is a controller and regulate other Doshas, Dhatus and Malas and also all the body activities. Basti is always applicable to those who are emaciated due to overwork, physical exercise, weight lifting, wayfaring journey on vehicles and indulgence in women as well as debilitated person and those afflicted with Vata disorders.

Agada and Visha Dravya Prayoga in the prevention and management of cancer along with its research updates.

1. बिल्वादि अगद - Hepato protective and Radiotoxicity protection
2. कल्याणक अगद - Radiotoxicity protection
3. अजितागद - Nephro toxicity protection
4. मालत्यादि अगद - Hemotoxicity protection
5. दूषीविषारी अगद - Lichen planus
6. भूनिम्बादि अगद - Dushivishari agada, Ecoli, Staphylococcus oreus, Shigella sonnei, Salmonella enterica
7. धातक्यादि अगद - Ecoli, Staphylococcus oreus, Streptococcus mutans
8. शिरीष, पुर्ननवा, तुलसी - Reproductive and development toxicity
9. विषघ्न महाकषाय - All type of Cancer

Ayurvedic management in cancer-

- | | |
|---------------|-------------|
| 1. स्नेहन | 2. स्वेदन |
| 3. रक्तमोक्षण | 4. वमन |
| 5. विरेचन | 6. बस्ति |
| 7. नस्य | 8. शिरोधारा |

Forensic Medicine (Vyavahara Ayurveda) and Medical Jurisprudence (Vidhi Vaidyaka)

Syllabus

1. Forensic Medicine and Medical Jurisprudence.
2. Introduction to Indian Penal Code, Indian. Evidence Act and Criminal Procedure Code.

Learning objectives

Define Forensic Medicine & Medical Jurisprudence. Give an introduction to Indian Penal Code (IPC), Criminal Procedure Code (CrPC) and Indian Evidence Act (IEA).

Total - 1 hours (Lecture :01 hour, Non-lecture: 00 hours)

MCQ- Yes- SAQ (5 Marks)- No- LAQ (10 Marks)- No

Definition of Forensic Medicine

- Latin word- Forum or Court i.e. legal
Medicine - medical aspect.
- It is the branch of medicine that deals with the application of knowledge of medicine for the purpose of law.
- It deals with application of medical knowledge to aid in the administration of justice.

Medical Jurisprudence

- It is synonyms word to Forensic medicine.
- Juris (latin word) - Law.
- Prudential - Legal aspect of medical practices.
- It deals with legal responsibilities of physician.

Functions of forensic medicine

1. To investigate the crime and prevent the crime.
2. To save the life of innocent.
3. For preventive public health aspects.
4. Property inheritance.
5. Age estimation.

Forensic report

1. Preamble (police request, consent, name, age, etc)
2. Examinational findings (clinical, post-mortem, labrotary, radiological etc)

3. Conclusion

History of Vyavahara Ayurveda (Forensic medicine) and Vidhivaidyaka (Medical jurisprudence)

From the origin age of human and civilization, worship – magic – witchcraft were the natural remedies for normalisation of health. To protect their health, they formed some rule and regulations, supposed to be the origin of medical jurisprudence.

i. Code of Hammurabi of Babylon (2000-1000 BC)

- Oldest medico-legal code given by king of Babylon,
- Related to punishment of practioners for improper treatment.

ii. Code of Hittite (1400 BC) : Related to compensation for personal injuries.

iii. Roman law (451 BC) : Related to medicolegal matters.

iv. Hippocrates (460-377 BC) : Described about medical ethics, death and lethality of wound.

v. Justinian code (AD 529-564) : Penalties for medical practice and principle of regulation of medical profession.

vi. The Barbarian Statute : Role of medical expert in evaluating injuries.

vii. Forensic medicine in India

- In India, Manu (3102 BC) was the first king who gave laws in his famous treatise, "Manusmriti" contained various laws, e.g. For marriages and punishment for various offences like adultery, seduction and carnal knowledge with force, incest, unnatural sexual offences, etc. Intoxication, illness and age, mental illnesses were also described.
- Similarly, Ayurveda is ancient system of medicine and the "Charaka Samhita" written by 'Agniwesh' is oldest treatise about the seventh century BC. It described code regarding the training, duties, privileges and social status of physicians. It can be considered as the origin of medical ethics. It also gives a detailed description of various poisons, symptoms, signs and treatments of poisoning.
- Sushruta Samhita (200 and 300 AD) described chapters concerning forensic medicine.
- In 4th and 3rd century BC, Kautilya gave the law code, penal laws, medical practice regulation and medical knowledge for the purposes of law.

Indian Penal Code

Indian penal code (IPC) deals with substantive criminal law of India. It define offences and prescribed punishments for different criminal offences.

Important offences related to IPC sections**(A) Criminal responsibility (whether a person is responsible for crime or not)**

82 IPC	A child under the age of seven is incapable of committing an offence.
83 IPC	A child 7-12 years of age is presumed to be capable to committing an offence if he has obtained sufficient maturity to understand and

	judge the nature consequences of his conduct.
89 IPC	A child under 12 years of age can not given valid consent to suffer any harm which can occur from an act done in good faith for the benefit of child, e.g., a consent for a surgery. Only guardian can give such consent.
87 IPC	A person below 18 years of age cannot give valid consent to suffer any harm which can cause death or grievous hurt, e.g. consent for wrestling.
84 IPC	Act of a person with unsound (insane) mind is not an offence. This act is related to insanity and criminal responsibility, MC Naughten rule (right or wrong test) is a legal test for criminal responsibility of insane and comes under section 84 IPC.
85 and 86 IPC	According to 85 IPC section, act of an intoxicated (e.g., drunk) person is not an offence if he has been intoxicated against his will. On the other hand, 86 IPC states that the act of an intoxicated (drunk) person is an offence if he had the intention or knowledge of committing a crime, i.e., the person is criminally responsible. 85 and 86 IPCs are related to drunkenness and criminal responsibility.
88 IPC	Act not intended to cause death, but can cause death or

	grievous hurt, done by consent in good faith and for the benefit of that person, e.g., death of a patient caused by surgery done by a surgeon.
94 IPC	Act to which a person is compelled by threat, is not an offence.

(B) Offences related to abortion and child birth

312, 313, 314 and 315 IPC	For causing voluntary miscarriage (criminal abortion)
312 IPC	Causing miscarriage with consent of woman (3 years of imprisonment $\pm$ fine).
313 IPC	Causing miscarriage without consent of lady (10 years of imprisonment which can extend upto life $\pm$ fine).
314 IPC	Death of patient caused by miscarriage (10 years of imprisonment $\pm$ fine).
315 IPC	Act done with intent to prevent child being born alive or to cause it to die after birth (10 years of imprisonment $\pm$ fine)
318 IPC	Concealment of birth by secret disposal of dead body (2 years imprisonment $\pm$ fine).

(C) Offences affecting life

299 IPC	Culpable homicide not amounting to murder), i.e. causing death with the intention of causing death of the person.
301 IPC	Culpable homicide by causing death of person other than person whose death was intended.
300 IPC	Murder (defining murder).

302 IPC	Punishment for murder (Death of life imprisonment).
303 IPC	Punishment of murder of life convict (Death).
304 IPC	Punishment of culpable homicide, not amounting to murder (10 years imprisonment $\pm$ fine).
305 IPC	Abetment of suicide of child or insane person.
306 IPC	Abetment of suicide.
307 IPC	Attempt to murder (10 years imprisonment $\pm$ fine).
308 IPC	Attempt to commit culpable homicide (3-7 years imprisonment $\pm$ fine).
309 IPC	Attempt to commit suicide (1 year imprisonment + fine).

(D) Offences related to Hurt

319 IPC	Defines hurt.
320 IPC	Defines grievous hurt
321 IPC	Voluntarily causing hurt.
322 IPC	Voluntarily causing grievous hurt.
323 IPC	Punishment for voluntarily causing hurt (no provocation, no dangerous weapon) (1 year imprisonment).
324 IPC	Punishment for voluntarily causing hurt by dangerous weapon (3 years imprisonment $\pm$ fine)
325 IPC	Punishment for voluntarily causing grievous hurt (no provocation, no dangerous weapon) (7 years imprisonment $\pm$ fine).

326 IPC	Punishment for voluntarily causing grievous hurt by dangerous weapon (10 years imprisonment $\pm$ fine).
327 IPC	Causing hurt to extort property (10 years imprisonment $\pm$ fine)
328 IPC	Causing hurt by poison (10 years imprisonment $\pm$ fine).
329 IPC	Causing grievous hurt to extort property (10 years imprisonment which can extend upto life $\pm$ fine).
331 IPC	Causing grievous hurt to extort confession (10 years imprisonment $\pm$ fine).
332 IPC	Causing grievous hurt to deter public servant from duty discharge his (3 years imprisonment $\pm$ fine).
333 IPC	Causing grievous hurt to deter public servant from his duty (10 years imprisonment $\pm$ fine).
334 IPC	Causing hurt on provocation (1 month imprisonment $\pm$ fine).
335 IPC	Causing grievous hurt on provocation (4 years imprisonment $\pm$ fine).
336 IPC	Act endangering life or personal safety.
337 IPC	Causing hurt by endangering life/safety.
338 IPC	Causing grievous hurt by endangering life/safety.

(E) Offences related to Dowry

304-B IPC	Dowry death (10 years of imprisonment which can extend to life).
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498-A IPC	Punishment for cruelty by husband or his relatives.
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(F) Rape and other sexual offences and assault

228 IPC	Prohibits disclosure of identity of rape victim
375 IPC	Defining rape.
376-A IPC	Punishment for rape (7 years of life imprisonment $\pm$ fine)
377 IPC	Unnatural sexual offences (10 years to life imprisonment $\pm$ fine).
354 IPC	Assault or criminal force to woman with intent to outrage her modesty.
366-A IPC	Procuration of minor girl for illicit intercourse.
351 IPC	Defines assault.
352-358 IPC	Punishment for causing assault.
509 IPC	Word, gesture or act intended to insult he modesty of a women.

(G) Perjury, Hostile witness and false certificate

191 IPC	(i) Giving false evidence (perjury under oath and (ii) hostile witness.
192 IPC	Fabricating false evidence (perjury).
193 IPC	Punishment for false evidence (punishment for perjury) : Imprisonment upto 7 years $\pm$ fine.
194 IPC	Giving or fabricating false evidence to procure conviction of capital offence.
195 IPC	Giving or fabricating false

	evidence to procure conviction of offence punishable with imprisonment for life.
197 IPC	Issuing or signing (attesting) false certificate by a doctor is a criminal offence.
201 IPC	Causing disappearance of evidence.
(H) Others	
304-A IPC	Causing death by negligence (criminal negligence) which also includes medical negligence (Punishment up 2 years or fine or both).
53 IPC	An accused can be examined by a medical practitioner at request of police, even without his consent or by force.
330, 331, 339, 341 IPCs	Torture
361 to 369 IPCs	Kidnapping.
87 to 93 IPCs	Legal protection to medical doctors.
190 IPC	Threat of refraining a person from applying protection to a public servant.
201 IPC	Punishment for embalming before autopsy.

Indian evidence Act (IEA) : 1872

- This act is originally passed in British Raj in 1872.
- It deals with law of evidence (different categories of evidence, procedure of collection, preservation and use of different evidences) and applies to all judicial proceedings in any court. It is common to both the criminal and civil procedure.

This act is divided into 3 parts :

Part 1	Chapter I	Introduction of this act
	Chapter II	Relevancy of the facts
Part 2	Chapter III	Facts which need to be proved
	Chapter IV	Oral evidence
	Chapter V	Documentary evidence
	Chapter VI	Circumstance when documentary evidence given preference over oral
Part 3	Chapter VII	Burden of Proof
	Chapter VIII	Estoppel
	Chapter IX	Witness
	Chapter X	Improper admission and rejection of evidence

Criminal Procedure Code (CRPC), 1973

It provides the mechanism for punishment of offences against substantive criminal law. In simple words, it prescribes the procedure of investigation and trial of criminal offences.

Important sections of CrPC

2 (C) CrPC	Cognisable offences.
6 to 25 CrPC	Constitution of criminal courts and officer.
26 CrPC	Division of offences.
27-35 CrPC	Power of courts.
39 CrPC	Every person should give information to nearest magistrate or police officer. If that person is away commission of or intention of commission of an offence which is punishable under IPC.
40 CrPC	Duty of officers

	appointed and every person residing in a village to inform unnatural death of dead body found.
160 CrPC	Police officer has the power to summon any witness to police station for recording of statement (a male below 15 years and a women cannot be called to police station).
161 CrPC	Police officer has the power to examine witness.
162 CrPC	Oral statements made to the police and recorded by the police should not be signed.
174 CrPC	Police inquest.
174 (3) CrPC	Procedure in dowry death.
175 CrPC	Power of police to summon panchas.
176 CrPC	Magistrate inquest

225 to 237 CrPC	Session's trial.
238 to 265 CrPC	Magistrate's trial.
Section 416 CrPC	Postponement of capital sentences on pregnant woman or its communication of imprisonment for life can be done by the high court.
Section 409 CrPC	Withdrawal of cases and appeals by Session judge.
Section 410 CrPC	Withdrawal of cases by Judicial Magistrate
Section 411 CrPC	Making over or withdrawal of cases by executive magistrates.
Section 412 CrPC	Reasons to be recorded— A Session judge or Magistrate making an order under section 408, 409, 410 or 411 shall record his reasons for making it.

IPC defines the criminal offences and prescribes punishment to such offences. Whereas CrPC prescribes the procedure of investigation (eg. arrest, summon etc.) and trial of criminal offences.

Vaidya Sadvritta: Duties and Responsibilities of Medical Practitioner

Syllabus

1. Vaidya sadvritta, medical ethics and code of conduct, Charaka oath and Hippocratic oath.
2. NCISM - constitution, objectives and functions.
3. Duties, rights and privileges of a registered medical practitioner.
4. Consent, professional secrecy and privileged communication.
5. Professional negligence, professional misconduct and unethical practices.
6. Defenses in medical negligence suits.
7. Medical records.
8. Consumer Protection Act.

Learning objectives

1. Describe Vaidya Sadvritta, medical ethics, code of conduct, Charaka oath and Hippocratic oath.
2. Describe the constitution, objectives and functions of NCISM.
3. Describe the duties and rights and privileges of a registered medical practitioner
4. Describe consent, professional secrecy and privileged communication.
5. Describe professional negligence, professional misconduct and unethical practices.
6. Explain the defences in medical negligence suits with appropriate case laws.
7. Describe the maintenance of medical records and explain its significance.
8. Describe the Consumer Protection Act.

Total - 10 hours (Lecture :06 hour, Non-lecture: 04 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

Vaidya sadvritta, medical ethics and code of conduct, Charaka oath and Hippocratic oath.

वैद्य गुण (Qualities of Vaidya-physician)

श्रुते पर्यवदातत्वं बहुशो दृष्टकर्मता ।
दाक्ष्यं शौचमिति ज्ञेयं वैद्ये गुणचतुष्टयम् ॥
(च.सू. 9/6)

- Shrute Paryavadatvatvam- Excellent medical knowledge, sound knowledge of text books/ health literature
- Bahusho Drushtakarmata - Extensive practical knowledge and experience

- Dakshya - Dakshata-dexterity
- Shaoucha - Cleanliness are the qualities of Physician.

Six qualities of Vaidya (physician)

विद्या वितर्को विज्ञानं स्मृतिस्तत्परता क्रिया ।
यस्यैते षड्गुणास्तस्य न साध्यमतिवर्तते ॥
(च.सू. 9/21)

- Vidya - Knowledge of Ayurveda
- Vitarka - Critical approach, analytical mind
- Vijnana - Insightful understanding, special knowledge

- Smruti - Good memory
- Tatparata - Dedication in cure disease or perseverance
- Kriya - Practical knowledge.

यस्तूभयज्ञो मतिमान् स समर्थोऽर्थसाधने ।
आहवे कर्म निर्वोदुं द्विचक्रः स्यन्दनो यथा ॥
(सु.सू. 3/53)

He who possesses good knowledge of both (theory and practice) and intelligent, such a person (physician) only is capable of achieving the aims, just like a chariot of two wheels is capable of performing all its functions in the battle field.

Bhishaka Lakshana (qualities of physician)

अभेद्योऽनुद्धतः स्तब्धः सुनृतः प्रियदर्शनः ।
बहुश्रुतः कालवेदी ज्ञातग्रन्थोऽर्थशाधिवित् ॥
अनाथान् रोगणो याच पुत्रवत् समुपाचरेत् ।
गुरुणा समनुज्ञातः स भिषक्छब्दमश्नुते ॥
(अ.सं.सू. 2/8-9)

He, who is invincible (in debate), unopposed, steadfast, friendly and polite with all; pleasing in appearance, who has read many sciences, knows the appropriate time (for every activity); who has mastered the science (of Ayurveda), is conversant with Arthashastra (etymology); who looks after the destitute and the sick as his own children and who has obtained permission from his teacher (to practise medicine) deserves to be called a "Physician".

चिकित्सिते त्रयः पादा यस्माद्वैद्यव्यपाश्रयः ।
तस्मात् प्रयत्नमातिष्ठेद्विषक् स्वगुणसंपदि ॥
(च.सू. 9/25)

As the remaining three factors (patient, medicine and nurse) of treatment depend on the quality of the physician, a physician should always thrive hard to have all the required good qualities.

Chaturvidha Vaidya Vrutti (four aims of physician)

मैत्री कारुण्यमार्तेषु शक्ये प्रीतिरुपेक्षणम् ।
प्रकृतिस्थेषु भूतेषु वैद्यवृत्तिश्चतुर्विधेति ॥
(च.सू. 9/26)

Vaidya (doctor) should be :

1. Maitri (friendliness)

2. Karunyam Artheshu - Sympathetic and kindness toward patients.
3. Shakye Pritih - Should be concentrate only on the diseases that can be cured
4. Upekshanam Prakrutishteshu- Should neglect the incurable diseases. These are the four disciplines for physician.

Relation of patient and doctor

मिथ्यादृष्टा विकारा हि दुराख्यातास्तथैव च ।
तथा दुष्परिमृष्टाश्च मोहयेयुश्चिकित्सकम् ॥
(सु.सू. 10/6)

Diseases which are observed improperly (by the physician), which have not been described well (by the patient or his kin) and which have not been examined thoroughly (and diagnosed correctly) are going to confuse the physician.

स्त्रीभिः सहास्यां संवासं परिहासञ्च वर्जयेत् ।
दत्तञ्च ताभ्यो नादेयमन्नादन्यद्विषग्वरैः ॥
(सु.सू. 10/9)

The ideal physician should avoid sitting together with women, residing with them, cutting jokes with them, accepting anything given by them except food.

वैद्य प्रकार

1. कुवैद्य

स्नेहादिष्वनभिज्ञो यश्छेद्यादिषु च कर्मसु ।
ते निहन्ति जनं लोभात् कुवैद्या नृपदोषतः ॥
(सु.सू. 3/52)

He who is not well versed in oleation etc. (procedure of different therapies and in acts such as excision etc. (surgical techniques) kills the people by his greed; such Kuvaidya (quack physicians) thrive due to the inefficiency of the king.

2. तस्कर वैद्य

शास्त्रं गुरुमुखोद्गीर्णमादायोपास्य चासकृत् ।
यः कर्म कुरुते वैद्यः स वैद्योऽन्ये तु तस्कराः ॥
(सु.सू. 4/8)

He who practices medicine, after learning the science from a preceptor and engaged constantly in recapitulating it, such a person can only be called a physician, whereas all others are impostors.

3. अयोग्य वैद्य

यस्तु केवलशास्त्रज्ञः कर्मस्वपरिनिष्ठितः ।
 स मुह्यत्यातुरं प्राप्य प्राप्य भीरुरिवाहवम् ॥
 यस्तु कर्मसु निष्णातो धार्ष्ट्याच्छास्त्रबहिष्कृतः ।
 स सत्सु पूजां नाप्नोति वधं चर्च्छति राजतः ॥
 उभावेतावनिपुणावसमर्थौ स्वकर्मणि ।
 अर्धवेदधरावेतावेकपक्षाविव द्विजौ ॥
 ओषध्योऽमृतकल्पास्तु शस्त्राशनिविषोपमाः ।
 भवन्त्यज्ञैरुपहृतास्तस्मादेतान् विवर्जयेत् ॥
 (सु.सू. 3/48-51)

He who knows the science only (in theory) but is not skilled in practice becomes confused on approaching the patient just like a coward in a battle field. He who is skilled in practice through audacity and acts apart from the dictates of the science, does not get respect from the wise and deserves killing by the king. Both these kinds of persons (physicians) are unqualified and incapable of performing their duties (satisfactorily), since they possess half knowledge of the science, like a bird with only one wing.

यदृच्छया समापन्नमुत्तार्य नियतायुषम् ।
 भिषङ्मानी निहन्त्याशु शतान्यनियतायुषाम् ॥
 (च.सू. 9/17)

Bhisangmani (one regarding himself as physician) cures by chance a diseased person of Niyatayusha (whose life span is certain) but, on the other hand, kills hundred having Aniyatayusha (uncertain life span).

4. राजा योग्य वैद्य

हेतौ लिङ्गे प्रशमने रोगाणामपुनर्भवे ।
 ज्ञानं चतुर्विधं यस्य स राजार्हो भिषक्तमः ॥
 (च.सू. 9/19)

One who possesses the knowledge of the below four factors is fit to become Royal physician. Those factors are Hetu (causative factors for diseases), Linga (characteristic features of diseases), Prashamana (treatment methods for diseases) and Rogaanaam Apunarbhava (preventive of recurrence of diseases) is the best Bhishak and fit to be a Raja Vaidya.

5. प्राणाभिसार वैद्य

प्राणानामेकेऽभिसरा हन्तारो रोगाणां ।
 (च.सू. 29/5)

Pranabhisara - Who saves lives and kills diseases.

तस्माच्छास्त्रेऽर्थविज्ञाने प्रवृत्तौ कर्मदर्शने ।
 भिषक् चतुष्टये युक्तः प्राणाभिसर उच्यते ॥
 (च.सू. 9/18)

Physician devoted to these four Shastra (duly engaged in the study of the science), Artha (understanding the science in proper manner), Vijnana (right application of the treatment), Pravrutta (self-initiated to perform the treatment) with Karma Darshana (practical experience), Such a doctor is known as Pranabhisara Vaidya.

6. रोगाभिसार वैद्य

रोगाणामेकेऽभिसरा हन्तारः प्राणानामिति ॥
 (च.सू. 29/5)

Rogabhisara - Who worsen diseases and kill life.

अतो विपरीता रोगाणामभिसरा हन्तारः प्राणानां,
 भिषक्छद्मप्रतिच्छन्नाः कण्टकभूता लोकस्य प्रतिरूपकसधर्माणो
 राज्ञां प्रमादाच्चरन्ति राष्ट्राणि ॥ (च.सू. 29/8)

Rogabhisara Vaidya has opposite to that of Pranabhisara Vaidya. They facilitates the Roga (disease) and removes Prana (life). These Bhishaka Chadma Praticchanna (cast physicians) like Kantaka Bhutta Likasya (thorns to people) and prevail in the world due to neglect on the part of the king.

त्रिविध वैद्य

भिषक्छद्मचराः सन्ति सन्त्येके सिद्धसाधिताः ।
 सन्ति वैद्यगुणैर्युक्तास्त्रिविधा भिषजो भुवि ॥
 (च.सू. 11/50)

There are three types of physicians Chadmachara, Siddhisadita and Vaidya Guna Yukta- here first two types of Vaidya is consider as Jnana Hina (quacks-ignorant).

छद्मचर वैद्य-

वैद्यभाण्डौषधैः पुस्तैः पल्लवैरवलोकनैः ।
 लभन्ते ये भिषक्शब्दमज्ञास्ते प्रतिरूपकाः ॥
 (च.सू. 11/51)

Chadmachara/Bhishaka Veshachara (quacks, pseudo physicians) - They pose themselves as doctors by exhibiting a few medical books, medicine fresh leaves in box etc. These persons are devoid of knowledge.

सिद्धसाधित वैद्य-

श्रीयशोज्ञानसिद्धानां व्यपदेशादतद्विधाः ।
वैद्यशब्दं लभन्ते ये ज्ञेयास्ते सिद्धसाधिताः ॥
(च.सू. 11/52)

Siddha Sadhita (feigned physicians) - Get the names of famous Vaidya by boasting about their relations with accomplished physician having wealth, fame and knowledge, these are ignorant and are called Sidha Sadhita.

जीविताभिसार वैद्य-

प्रयोगज्ञानविज्ञानसिद्धिसिद्धाः सुखप्रदाः ।
जीविताभिसरास्ते स्युर्वैद्यत्वं तेष्ववस्थितमिति ॥
(च.सू. 11/53)

Jivitabhisara Vaidya/ Vaidya Guna Yukta- The character of a Vaidya who is endowed practical knowledge. Scriptural knowledge, accomplished in the administration of therapies, insight and knowledge of therapeutics are endowed with infallible success and can bring out happiness to the patient are (Jivitabhisarah) saviours of life.

वैद्य सद्वृत्त (Practice regarding social relations)

ब्रह्मचर्यज्ञानदानमैत्रीकारुण्यहर्षोपेक्षाप्रशमपरश्च स्या-
दिति ॥ (च.सू. 8/29)

One should follow Brahmacharya (celibacy), Jnana (knowledge), Dana (donation), Maitri (empathy), Karunya (compassion), Harsha (happiness), Upeksha (detachment), Prashama (peace).

न कार्यकालमतिपातयेत्, नापरीक्षितमभिनिविशेत्, नेन्द्रियवशगः स्यात्, न चञ्चलं मनोऽनुभ्रामयेत्, न बुद्धीन्द्रियाणामतिभारमादध्यात्, न चातिदीर्घसूत्री स्यात्, न क्रोधहर्षावनुविदध्यात्, न शोकमनुवसेत्, न सिद्धावुत्सेकं यच्छेन्नासिद्धौ दैन्यं, प्रकृतिमभीक्षणं स्मरेत्, हेतुप्रभावनिशिचतः स्याद्धेतुवारम्भनित्यश्च, न कृतमित्याश्वसेत्.....॥
(च.सू. 8/27)

Na Karya Kalam Atipatayeta (one should not postpone things at time of action), Na Parikshitam

Abhinivisheta (should not take up anything without examining it), Na Indriya Vashaga Syata (one should not be submissive to his sense organs), Na Chanchalam Mano Anubhramayet (one should not be trickle minded), Na Buddhi Indriyanam Atibharam Adadhyat (one should not over burden the sense organs), Na Cha Ati Dirghasutri Syat (one should not be too much dilatory), Na Krodha Harsha Anuvidadyata (one should not act under emotions of anger or exhilaration), Na Shokam Anuvaset (one should not live under continued grief), Na Siddha Utseka Yat Cchen Nasiddhau Dainyam (one should not feel exhilarated in success and depressed in failure), Prakrtim Ahabhiksnam Smaret (one should always keep his constitution in mind), Hetu Prabhava Nischitah Syat Hetu Arambha Nityascha (one should be confident of the effect of a cause and initiate the cause), Na Krutam Iti Ashvaset (one should not assume that nothing is to be done now), Na Viryam Jahyat (one should not give up courage), Na Apavadam Anusmaret (one should not remember blame).

The Ethics of Medical Practice (Medical Ethics)

Ethics

The principles of medical ethics have developed over several thousand years and continue to evolve and change, influenced by society, the legal profession and the medical profession itself. The laws governing the medical practices vary from country to country, but the broad principles of medical ethics are universal and are formulated by the World Medical Association (WMA).

International Code of Medical Ethics for Doctors

In International Code of Medical Ethics, World Medical Association, Geneva 1983 stated that "A physician shall preserve confidentiality on all he knows about his patient even after the patient has died".

World Medical Association Geneva, mentioned this matter in 1983 that "I will respect the secrets

which are confided in me, even after the patient has died”.

In India, the registered medical practitioner should follow the rules and regulation of council or board, that also gives the direction not disclose the secrets of a patient that have been learnt in the exercise of his profession except in a court of law or notifiable diseases.

Code of Medical Ethics

The Famous code of medical ethics is the Hippocratic Oath and Charak Oath. Even after twenty-five countries its basic principles are still valid and are followed.

1. The Charak Oath

In India, Charak was the first physician to start the practice of oath many centuries ago. Young doctors take the Charak Oath before starting medical practice and it is administered during the convocation when the degree is awarded.

Oath :

अथैनमग्निसकाशे ब्राह्मणसकाशे भिषक्सकाशे चानुशिष्यात्-
The teacher then should instruct the disciple in the presence of the sacred fire, brahmanas and physicians.

ब्रह्मचारिणा श्मश्रुधारिण सत्यवादिनाऽमांसादेन मेध्यसेविना
निर्मत्सरेणाशस्त्रधारिणा च भवितव्यं, न च ते मद्वचनात्
किञ्चिदकार्यं स्यादन्यत्र राजद्विष्टात् प्राणहराद्विपुलादधर्म्या-
दनर्थसम्प्रयुक्ताद्वाऽप्यर्थात्-(Saying) “Thou shalt lead the
life of a bachelor (Brahmachari), grow thy hair and
beard, speak only the truth, eat no meat, eat only
pure articles of food, be free from envy and carry
no arms. There shall be nothing that thou oughtest
not do at my behest except hating the king or
causing another's death or committing an act of
great unrighteousness or acts leading to calamity.

मदर्पणेन मत्प्रधानेन मदधीनेन मत्प्रियहितानुवर्तिना च
शश्वद्भवितव्यं, पुत्रवद्वासवदर्थिवच्चोपचरताऽनुवस्तव्योऽहम्,
अनुत्सेकेनावहितेनानन्यमनसा विनीतेनावेक्ष्यावेक्ष्यकारिणा-
ऽनसूयकेन चाभ्यनुज्ञातेन प्रविचरितव्यम्, अनुज्ञातेन (चाननुज्ञातेन
च) प्रविचरता पूर्वं गुर्वर्थोपाहरणे यथाशक्ति प्रयतितव्यं-
Thou shalt dedicate thyself to me and regard me as thy
chief. Thou shalt be subject to me and conduct

thyself for ever for my welfare and pleasure. Thou shalt serve and dwell with me like a son or a slave or a suppliant. Thou shalt behave and act without arrogance and with care and attention, and with undistracted mind, humility, constant reflection, and with ungrudging obedience. Acting either at my behest or otherwise, thou shalt conduct thyself for the achievement of thy teacher's purpose alone to the best of thy abilities.

कर्मसिद्धिमर्थसिद्धं यशोलाभं प्रेत्य च स्वर्गमिच्छता भिषजा
त्वया गोब्राह्मणमादौ कृत्वा सर्वप्राणभृतां शर्माशासितव्यम-
हरहरुत्तिष्ठता चोपविशता च- If thou desirest success,
wealth and fame as a physician and heaven after death, thou shalt pray for the welfare of all creatures beginning with the cows and brahmanas.

सर्वात्मना चातुराणामारोग्याय प्रयतितव्यं, जीवितहेतोरपि
चातुरेभ्यो नाभिद्रोघव्यं, मनसाऽपि च परस्त्रियो नाभिगमनीया-
स्तथा सर्वमेव परस्वं, निभृतवेशपरिच्छदेन भवितव्यम्,
अशौण्डेनापापेनापापसहायेन च, श्लक्ष्णशुक्लधर्म्यशर्म्यधन्य-
सत्यहितमितवचसा देशकालविचारिणा स्मृतिमता ज्ञानोत्थानोप-
करणसम्पत्सु नित्यं यत्नवता च-Day and night, however
thou mayest be engaged, thou shalt endeavour for the relief of patients with all thy heart and soul. Thou shalt not desert or injure thy patient even for the sake of thy life or thy living. Thou shalt not commit adultery even in thought. Even so, thou shalt not covet other's possessions. Thou shalt be modest in thy attire and appearance. Thou shouldst not be a drunkard or a sinful man nor shouldst thou associate with the abettors of crimes. Thou shouldst speak words that are gentle, pure and righteous, pleasing, worthy, true, wholesome and moderate. Thy behaviour must be in consideration of time and place and heedful of past experience. Thou shalt act always with a view to the acquisition of knowledge and the fullness of equipment.

न च कदाचिद्राजद्विष्टानां राजद्वेषिणां वा महाजनद्विष्टानां
महाजनद्वेषिणां वाऽप्यौषधमनुविधातव्यं, तथा सर्वेषामत्यर्थ-
विकृतदुष्टदुःखशीलाचारोपचाराणामनपवादप्रतिकारणां मुमूर्षूणां
च, तथैवासन्निहितेश्वराणां स्त्रीणामनध्यक्षाणां वा-No persons,
who are hated of the king, or who are haters of the king or who are hated of the public, shall receive treatment. Similarly, those that are very unnatural, wicked and miserable character and conduct, those

who have not vindicated their honour and those that are on the point of death and similarly women who are unattended by their husbands or guardians shall not receive treatment.

न च कदाचित् स्त्रीदत्तमामिषमादातव्यमनुज्ञातं भर्ताऽथवाऽध्यक्षेण, आतुरकुलं चानुप्रविशता विदितेनानुमतप्रवेशिना सार्धं पुरुषेण सुसंवीतेनाविश्वासं स्मृतिमता स्तिमितेनावेक्ष्यावेक्ष्य मनसा सर्वमाचरता सम्यगनुप्रवेष्टव्यम्, अनुप्रविश्य च वाङ्मनोबुद्धीन्द्रियाणि न क्वचित् प्रणिधातव्यान्यत्रातुरादातुरोपकारार्थादातुरगतेष्वन्येषु वा भावेषु, न चातुरकुलप्रवृत्तयो बहिर्निश्चारयितव्याः, हसित चायुषः प्रमाणमातुरस्य जानताऽपि त्वया न वर्णयितव्यं तत्र यत्रोच्यमानमातुरस्यान्यस्य वाऽप्युपघाताय सम्पद्यते—No offering of meat by a woman without the behest of her husband or guardian shall be accepted by thee. While entering the patient's house, thou shalt be accompanied by a man who is known to the patient and who has his permission to enter and thou shalt be well-clad and bent of head, self-possessed, and conduct thyself after repeated consideration. Thou shalt thus properly make thy entry. Having entered, thy speech, mind, intellect and senses shall be entirely devoted to no other thought than that of being helpful to the patient and things concerning him only. The peculiar customs of the patient's household shall not be made public. Even knowing that the patient's span of life has come to a close, it shall not be mentioned by thee there where if so done it would cause shock to the patient or to others,

ज्ञानवताऽपि च नात्यर्थमात्मनो ज्ञाने विकथितव्यम्, आप्तादपि हि विकथ्यमानादत्यर्थमुद्विजन्त्यनेके - Though of knowledge one should not boast very much of one's knowledge. Most people are offended by boastfulness of even those who are otherwise good and authoritative.

न चैव ह्यस्ति सुतरमायुर्वेदस्य पारं, तस्मादप्रमत्तः शश्वदभियोगमस्मिन् गच्छेत्, एतच्च कार्यम्, एवम्भूयश्च वृत्तसौष्ठवमनसूयता परेभ्योऽप्यागमयितव्यं, कृत्स्नो हि लोको बुद्धिमतामाचार्यः शत्रुश्चाबुद्धिमताम्, अतश्चाभिसमीक्ष्य बुद्धिमताऽमित्रस्यापि धन्यं यशस्यमायुष्यं पौष्टिकं लौक्यमभ्युपदिशतो वचः श्रोतव्यमनुविधातव्यं चेति—There is no limit at all to the “Science of Life”. So, thou shouldst apply thyself to it with diligence. This is how thou shouldst act. Again thou shouldst learn the skill of practice from another

without carping. The entire world is a teacher to the intelligent and the foe to the unintelligent. Hence, knowing this well, thou shouldst listen and act according to the words of instruction of even an unfriendly person, when they are worthy and such as bring fame to you and long life, and are capable of giving you strength and prosperity.”

अतः परमिदं ब्रूयात्- देवताग्निद्विजगुरुवृद्धसिद्धाचार्येषु ते नित्यं सम्यग्वर्तितव्यं, तेषु ते सम्यग्वर्तमानस्यायमग्निः सर्वगन्धरसरत्नबीजानि यथेरिताश्च देवताः शिवाय स्युः, अतोऽन्यथा वर्तमानस्याशिवायेति—Thereafter the teacher should say this - “Thou shouldst conduct properly with gods, the sacred fire, the twice-born, the guru, the aged, the adepts and the preceptors. If thou hast conducted thyself well with them, the fire, the fragrances, the tastes, the precious stones, the grains and the gods become well disposed towards thee. If thou shouldst conduct thyself otherwise, they become unfavourable to thee.”

एवं ब्रुवति चाचार्ये शिष्यः ‘तथा’ इति ब्रूयात्. यथोपदेशं च कुर्वन्नध्याप्यः, अतोऽन्यथा त्वनध्याप्यः. अध्याप्यमध्यापयन् ह्याचार्यो यथोक्तैश्चाध्यापनफलैर्योगमाप्नोत्यन्यैश्चानुक्तैः श्रेयस्कैर्गुणैः शिष्यमात्मानं च युनक्ति। इत्यध्यापनविधिरुक्तः—To the teacher that has thus spoken, the disciple should say “Even so”. If he behaves as instructed, he deserves to be taught, else, he does not deserve to be taught. The teacher who teaches the worthy disciples will obtain all the auspicious fruits of teaching, those described and even others not described here and obtains all auspicious qualities for himself as well as for his disciples. Thus has been described the method of instruction.

2. The Hippocratic Oath

I swear by Apollo the physician, by Asclepius, Hygieia and Panacea, and I take to witness all the Gods, all the Goddesses, to keep according to my ability and my judgment the following Oath :

“To consider dear to me as my parents him who taught me this art; to live in common with him and if necessary to share my goods with him; to look upon his children as my own brothers, to teach them this art if they so desire without fee or written promise; to impart to my sons and the sons of the master who taught me and the disciples who have

enrolled themselves and have agreed to the rules of the profession, but to these alone, the precepts and the instruction. I will prescribe regimen for the good of my patients according to my ability and my judgement and never do harm to anyone. To please no one will I prescribe a deadly drug, nor give advice which may cause his death. Nor, will I give a woman a pessary to procure abortion. But I will preserve the purity of my life and my art. I will not cut for stone, even for patients in whom the disease is manifest; I will leave this operation to be performed by practitioners (specialists in this art). In every house where I come, I will enter only for the good of my patients, keeping myself far from all intentional ill-doing and all seduction, and especially from the pleasures of love with women or with men, be they free or slaves. All that may come to my knowledge in the exercise of my profession or outside of any profession or in daily commerce with men, which ought not to be spread abroad. I will keep secret and will never reveal. If I keep this oath faithfully, may I enjoy my life and practise my art, respected by all men and in all times but if I swerve from it or violate it, may the reverse be my lot."

NCISM

- The NCISM (National Commission for Indian System of Medicine) is a Statutory and regulatory body formed by Government of India for framing policies for institutions engaged in Indian System of Medicine and medical professionals.
- The institution will have Boards of assessment and rating and Board of ethics and registration of practitioners of Indian systems of medicine.

Constitutions of NCISM

In pursuance of the provisions of National Commission for Indian System of Medicine (NCISM) Act 2020 (14 of 2020), the Indian Medicine Central Council (IMCC) Act 1970 (48 of 1970) has been repealed and all the provisions of the National Commission for Indian System of Medicine (NCISM) has been come into force with effect from the 11th day of June 2021.

Under the provisions of section 59 (2) of NCISM Act 2020 the Central Government has constituted the Commission and four Autonomous boards on the same day.

Medical standards, requirements and other provisions of the IMCC Act 1970 and the rules and regulations made thereunder shall continue to be in force and operate till new standards or requirements as specified under new act or rules and regulations made thereunder come into force. However, the provisions of concerned regulations which are inconsistent with the provisions of NCISM Act 2020 shall not be applicable.

Objectives of NCISM

The Aims and objectives of the National Commission for Indian System of Medicine are to-

1. Improve access to quality and affordable Ayurveda, Unani, Siddha and Sowa-Rigpa (AUS & SR) medical education
2. Ensure availability of adequate and high-quality AUS&SR medical professionals in all parts of the country;
3. Promote equitable and universal healthcare that encourages community health perspective and makes services of AUS&SR medical professionals accessible to all the citizens;
4. Encourage medical professionals to adopt latest medical research in their work and to contribute to research;
5. Objectively assess and rate medical institutions periodically in a transparent manner;
6. Maintain a National AUS&SR medical register for India;
7. Enforce high ethical standards in all aspects of AUS&SR medical services;
8. Have an effective grievance redressal mechanism.

Functions of NCISM

1. To provide medical education system that improves access to quality and affordable medical education.
2. To ensure availability of adequate and high-

quality medical professionals of Indian System of Medicine in all parts of the country.

3. To promote equitable and universal healthcare that encourages community health perspective and makes services of such medical professionals accessible and affordable to all the citizens.
4. To promote national health goals.
5. To encourage such medical professionals to adopt latest medical research in their work and to contribute to research.
6. To carry out Periodic and transparent assessment of medical institutions.
7. To facilitate maintenance of a medical register of Indian System of Medicine for India and enforce high ethical standards in all aspects of medical services.
8. To provide Medical Education System that is flexible to adapt to the changing needs and has an effective grievance redressal mechanism and for matters connected therewith or incidental thereto.

Organisational structure of NCISM and their role

National Commission for Indian System of Medicine is made up of 29 members appointed by the Central Government.

The organisation has two boards:

1. One for assessing and granting educational institution permission for Indian Systems of Medicine, and the other for
2. Ethics and registration of practitioners of Indian systems of medicine.

Roles of board members

- a) Frame policies for Institutions engaged in Indian System of Medicine and regulation of medical professionals.
- b) Assessment of healthcare infrastructure and related human resources.
- c) Regulations as per bill are adhered by State Medical Councils offering courses in Indian System of Medicine.

- d) Coordination between autonomous bodies formed under bill.

Medical ethics in practice

- a. Patient autonomy and their right to refuse or choose treatment.
- b. Non-maleficence – do no harm.
- c. Beneficence – acting in the patient's best interests.
- d. Dignity.
- e. Honesty – providing informed consent.
- f. Justice – how healthcare is apportioned when.
- g. Health and financial resources may be limited.

The key to a doctor–patient relationship is trust. If patients are not assured about confidentiality then they may be put off seeking medical attention or providing doctors with the right information to ensure they get optimal care.

When confidentiality may not apply

1. If required by law.
2. Reporting serious communicable diseases.
3. Reporting concerns about driving capabilities.

Duties of Physician or Registered Medical Practitioner

- a. Respect a competent patient's right to accept or refuse treatment.
- b. Deal honestly with patients and colleagues.
- c. Not receive any financial benefits or other incentives solely for referring patients or prescribing specific products.
- d. Behave towards colleagues as he/she would have them behave towards him/her.
- e. Provide a high standard of practice and care at all times.

Rights and privileges of Registered Medical Practitioner

1. To practice medicine
2. To choose patient
3. To prescribe/dispense medicines
4. To possess, dispense or prescribe drugs listed in the Dangerous Drug Act
5. To add professional titles to his name

6. To perform surgical operations
7. To issue certificate
8. To give evidence as an expert witness in the Court of law
9. To claim payments of fees for professional services given.

Rights and Privileges of Patients

1. To choose doctor
2. To access health care facilities available regardless of age, sex, caste, religion, and economic or social status.
3. To be treated with dignity, with care, respect and without any discrimination
4. To have privacy during consultation or treatment
5. To have confidentiality of all his information furnished to doctor
6. To receive full information about the diagnosis, investigations and available methods of treatment.
7. To know the procedure of operation, risk involved therein, available alternatives, the type of procedure, and the safety of procedure, results and prognosis.
8. To seek second opinion from another doctor.
9. To demand for the medical record.
10. To complain and rectification of grievances.
11. To obtain compensation for medical injuries or negligence.

Consent

Consent is defined as free and voluntary agreement, compliance or permission given for a specified act or purpose.

It is a key concept of healthcare and it is expected that all decisions about treatment and healthcare come about as a result of collaboration between doctors and patients. Consent should be based on trust, openness and good communication.

If patients are unable to make decisions the closed person of patient gives consent who care

the patient.

Importance of Consent

Medical procedure like examination, treatment, operation, diagnostic procedure or research on patient body has the right of person to give permission or not.

Consent is necessary by a doctor to examine, treat or operate a patient. Without consent of patient, treatment or examinations on patient is considered as an assault, because every person has the right to know and decide what shall be done to his body by rule of Self-defence of body (IPC 96 to 102, 104 -provides right to the protection of bodily integrity of a patient or person by other).

Professional Secrets and Confidentiality

It is the duty of doctor to not to divulge any information pertaining to his patients, except under following circumstances:

1. In a court of law under orders of the Presiding Judge
2. Privileged communication
3. In cases of notifiable diseases

Privileged Communication

It is a conversation between doctor and patient, which is protected from public disclosure, unless the doctor is legitimately concerned that criminal acts against others could be committed, and could be prevented by disclosure of said communication to proper authorities.

Professional Conduct and Etiquette Duties and Obligations Of

Practitioners of Indian Medicine Towards Patients and Public

Character of the Practitioners of Indian Medicine

The main object of the medical profession is to render service to humanity. Whosoever chooses this profession, assumes the obligation to conduct himself in accordance with its ideals. A practitioner

of Indian medicine shall be an upright man, instructed in the art and science of healing. He shall keep himself pure in character and be diligent in caring for the sick. He shall be modest, sober, patient, prompt to do his duty without anxiety and, pious in all the actions of his life.

Duties of practitioners of Indian medicine towards their patients

1. A practitioner of Indian medicine shall be ready to respond to the calls of the patients in emergencies for the sake of humanity and the noble traditions of the profession, though he is not bound, to treat each and every one asking his services.
2. He shall not permit, considerations of religion, nationality, race, caste, creed, party politics or social standing to intervene in his duties towards patients.

Practitioner's responsibility

A practitioner of Indian medicine shall merit the confidence of patients entrusted to his care, rendering to each a full measure of service and devotion and shall try continuously to improve his knowledge and skill.

He shall make available to his patients and colleagues the benefits of his professional attainment. The honoured ideals of the medical profession imply that the responsibility of such practitioner shall extend not only to individuals but also to society.

Patience, delicacy and secrecy

Patience and delicacy shall characterise the practitioner of Indian medicine. Confidence concerning individuals or domestic life entrusted by patients to a practitioner of Indian medicine and defects in the disposition or character of patients observed during medical attendance shall never be revealed unless their revelation is required by law. Sometimes, however, a practitioner must determine whether his duties to society require him to employ knowledge obtained through confidences to him as such practitioner to protect a healthy person

against a communicable disease to which he is about to be exposed.

In such instances, the practitioners of Indian medicine shall act as he would desire another to act towards one of his own family in like circumstances.

Prognosis

A practitioner of Indian medicine shall neither exaggerate nor minimise the gravity of a patient's condition and shall assure himself that the patients, his relatives or his responsible friends have such knowledge of the patient's condition as will serve the best interests of the patient and the family.

The patient must not be neglected

A practitioner of Indian medicine shall be free to choose whom he will serve. He shall, however, respond to any request for his assistance in any emergency or whenever temperate public opinion expect his services. Once having undertaken a case, the practitioner of Indian Medicine shall not neglect the patient, nor shall he withdraw from the case without giving notice to the patient, his relatives or his responsible friends sufficiently in advance to allow them to secure another medical attendant. No provisionally or fully registered medical practitioner of Indian medicine shall wilfully commit an act of negligence that may deprive his patient or patients from necessary medical care.

Upholding the honour of the profession

A practitioner of Indian medicine shall uphold the dignity and honour of his profession.

Engagement for an obstetric case

If a practitioner of Indian medicine agrees to attend a women during her confinement, he must do so. Inability to do so on an excuse of any other engagement is not tenable except when he is already engaged on a similar or other serious case. When a practitioner, who has been engaged to attend an obstetric case, is absent and another is sent for and delivery accomplished, the acting

practitioner is entitled to his professional fees, but shall secure the patient's consent to resign on the arrival of the practitioner engaged earlier.

Practitioner as a Citizen

A practitioner of Indian medicine as a good citizen, possessed of special training, shall advise concerning the health of the community wherein he dwells. He shall lend his support in enforcing the laws of the community and in sustaining in the institutions that advance the interests of humanity. He shall cooperate with the proper authorities in the administration of sanitary laws and regulations.

Public Health

A practitioner of Indian medicine especially engaged in public health work, shall enlighten the public concerning measures for the prevention of epidemics and communicable diseases. At all times, the practitioner shall notify the constituted public health authorities of every case of communicable disease under his care, in accordance with the laws, rules and regulations of the health authorities. When an epidemic prevails, he shall continue his labour without regard to the risk of his own health.

Duty of one Practitioner Towards another Practitioner :

Dependence of practitioners on each other

There is no rule that a practitioner of Indian medicine shall not charge another practitioner for his services, but a practitioner shall cheerfully and without recompense give his professional services to another practitioner or his dependents if they are in the vicinity.

Compensation for expenses : A practitioner of Indian medicine shall consider it a privilege to render gratuitous service to all practitioners and their immediate family dependents. When he is called from a distance to attend or advise another practitioner or his dependents, reimbursement shall be made to him for travelling and other incidental expenses.

Consultation to be encouraged : In case of serious illness, especially in doubtful or difficult conditions, a practitioner may request consultation.

Consultation for patients benefit : In every consultation, the benefit to the patient is of first importance. All practitioners interested in the case shall be candid with the patient, a member of his family or responsible friend.

Punctuality in consultation : Utmost punctuality shall be observed by a practitioner of Indian medicine in meeting for consultation.

Conduct in consultation: In consultations, no insincerity, rivalry or envy shall be indulged in. All due respect shall be observed towards the practitioners incharge of the case, and no statement or remark be made, which would impair the confidence reposed in him. For this purpose, no discussion shall be carried on in the presence of the patient or his representatives.

Statement to patient after consultation:

1. All statements of the case to the patient or his representatives shall take place in the presence of all the practitioners consulting, except as otherwise agreed the announcement of the opinion to the patient or his relatives or friends shall rest with the practitioner initially attending on the patient.
2. Difference of opinion shall not be divulged unnecessarily but when there is an irreconcilable difference of opinion the circumstances shall be frankly and impartially explained to the patient or his relatives or friends. It would be open to them to seek further advice, if they so desire.

Treatment after consultation : No decision shall restrain the attending practitioner of Indian medicine from making such subsequent variations in the treatment as any unexpected changes may require, but at the next consultation, reasons for the variations shall be stated. The same privilege, with its obligations belongs to the consultant when sent for in an emergency during the absence of attending practitioner of Indian medicine. The attending practitioner may prescribe at any time for the patient, the consultant only in case of emergency.

Visiting another practitioner's cases : A practitioner of Indian medicine called to visit a patient who has recently been under the care of another practitioner in the same illness, shall not take charge of, nor prescribe for such patient, except in a case of emergency when he shall communicate to the former explaining the circumstances under which the patient was seen and treatment given, or when the practitioner has relinquished his case, or when the patient has notified such practitioner to discontinue his services or unless the patient specifically refuses to go back to his original practitioner. When it becomes the duty of practitioner occupying an official position to see and report upon an illness or injury, he shall communicate to the practitioner attending so as to give him an option for being present. Such practitioner shall avoid remarks upon the diagnosis or the treatment that has been adopted.

Patient referred to specialists : When a patient is referred to a specialist by the attending practitioner, a statement of the case shall be given to the specialist who shall communicate his opinion in writing in a closed cover direct to the attending practitioner.

Code of Ethics

Advertising : Solicitation of patients directly or indirectly either personally or by advertisement in the newspaper, by placards or by distribution of circular cards or hand bills by a practitioner of Indian medicine is unethical. A practitioner shall not make use of or aid or permit others to make use of him or his name and/or photograph as subject of any form or manner of advertising or publicity. This provision shall not apply to authors of purely medical literature written for the advancement of the profession and science.

Nomenclature of qualification : It shall be compulsory for a practitioner of Indian medicine to affix the correct degree or diploma before or after his name.

Change of address and announcement relating thereto : A notice of change of address

shall be intimated by every practitioner of Indian medicine to the concerned State Board or Council and the Control Council.

A practitioner may issue a formal announcement in the Press one-insertion in one or more papers, regarding the following :

- a) On starting practice.
- b) On change of type of practice.
- c) On change of address.
- d) On temporary absence from duty.
- e) On resumption of practice.
- f) On succeeding to another practice.

Payment for professional services : A practitioner of Indian medicine shall not enter into a contract of "No cure, no payment".

Rebates and commission : A practitioner of Indian medicine shall not give, solicit, or receive nor shall he offer to give, solicit or receive, any gift, gratuity, commission or bonus in consideration of or in return for the referring, recommending or procuring of any patient for medical, surgical or other treatment.

He shall not directly or by any subterfuge participate in or be a party to the act of division, transference, assignment, subordination, rebating, splitting or refunding of any fee for medical, surgical or other treatment.

Evasion of legal restriction : A practitioner of Indian medicine shall observe the laws of the country in regulating the practice of medicine and shall not assist others to evade such laws.

Professional certificates, reports and other documents :

- 1) A registered practitioner of Indian medicine is, in certain cases, bound by law to give or may be called upon or requested from time to time to give certificate, notifications, reports or similar documents signed by him in his professional capacity for subsequent use in the course of justice or for administrative purposes.

- 2) Such documents include among other certificate, or reports:—
- Under the Acts relating to birth, death or disposal of the dead;
 - under the Acts relating to Lunacy and mental deficiency and the rules made there under;
 - under the vaccination Acts and the regulations made thereunder;
 - under the Factory Acts and the regulations made thereunder;
 - under the Education Acts;
 - under the Public Health Acts and the orders made thereunder;
 - under the Workmen's Compensation, Act;
 - under the Acts and order relating to the notification of infectious diseases;
 - under the Employee's State Insurance Act;
 - in connection with sick benefit insurance and friendly societies;
 - under the Merchant Shipping Act;
 - for procuring the issuing of passports;
 - for excusing attendance in courts of justice, in public services, in public offices or in ordinary employments;
 - in connection with rural and military matters;
 - in connection with matters under the control of ministry of the pensions.
- 3) Any practitioner of Indian medicine who shall be shown to have signed or given under his name and authority any such certificate, notification, report or similar document which is untrue, misleading or improper is liable for professional misconduct or disciplinary action under the Act or under any law for the time being in force in any State regulating the registration of such practitioner, to have his name removed from the Central Register of Indian Medicine and the provisions of section 27 shall apply.

Register of medical certificate issued by practitioner

A practitioner of Indian medicine shall maintain

a register of medical certificates giving full details of the certificates issued. When issuing a medical certificate, he shall always enter the identification marks of the patient and keep a copy of the certificate. He shall not omit to obtain the signature or thumb mark, address and identification marks of the patient on the medical certificates and on the copies kept by him.

Professional Misconduct and Unethical practices (Disciplinary Action)

1. The Central Council desires to bring the notice of the practitioners of Indian Medicine the following list of offences which constitute professional misconduct and may warrant disciplinary action against them under the Act or under any law for the time being in force in any State regulating the registration of such practitioners.

List

- Adultery or improper conduct or association with a patient. Any practitioner of Indian medicine who abuses his professional position by committing any adultery or improper conduct with a patient or by maintaining an improper association with a patient, is liable for disciplinary action under the Act or under any law for the time being in force in any State regulating the registration of such practitioners.
- any offences involving moral turpitude.
- if convicted under the provisions of the Drugs and Cosmetic Act, 1940 or the rules made hereunder.
- if convicted for selling Scheduled poison to the Public under the cover of his own qualification except to his patient, and in accordance with the provision of any law for time being in force,
- performing on enabling unqualified person to perform an abortion or any illegal operation for which there is no medical, surgical or psychological indication.
- A practitioner of Indian medicine shall not issue

certificates of efficiency in Indian Medicine to unqualified or non-medical person.

- vii) It is improper for a practitioner of Indian medicine to use an unusually large sign board and write on it anything other than his name, qualifications obtained from a University or a statutory body, titles and name of his speciality. The same should be common on his prescription papers. It is improper to affix a sign-board on a chemist's shop or in places where he does not reside or work.
- viii) Do not disclose the secrets of a patient that have been learnt in the exercise of the profession. Those may be disclosed only in a Court of Law under orders of the Presiding Judge.
- ix) Refusing on religious grounds alone to give assistance in conduct of sterility, birth control, craniotomies on living children, and therapeutic abortions when there is medical indication; unless the practitioner of Indian medicine feels himself incompetent to do so.
- x) Before performing an operation the consent in writing shall be obtained; from, the husband or wife, parent or guardian in the case of a minor, or the patient himself as the case may be. In an operation which may result in sterility the consent of both husband and wife is needed.
- xi) The photographs or case reports of patients shall not be published in any medical or other journal in a manner by which their identity could be made out without their permission. Should the identity be not disclosed his consent is not needed.
- xii) If a practitioner of Indian, medicine is running a Nursing home and he employs assistants to help him the ultimate responsibility rests on such practitioner.
- xiii) No practitioner of Indian medicine shall exhibit publically the scale of fees. But there is no objection to the same being put in the practitioners' consulting or waiting room.

xiv) No practitioner of Indian medicine shall use touts or agents for procuring patients.

xv) Advertisement through hoarding and tour programmes shall be unethical.

2. The appropriate authority that is to say, the State Board or the State Council may issue a letter of warning or may direct the removal altogether or for specified period from the register the name of any practitioner of Indian medicine who has been convicted of any specified offence or who after an inquiry, at which opportunity has been given to him to be heard in person or through a lawyer, has been held guilty of professional mis-conduct or infamous conduct in any professional respect, and the provisions of section 27 shall apply.

Acts for medical practice

1. The Drugs and Cosmetics Act 1940
2. The Drug (control) Act 1950
3. The Indian Penal Code 1860
4. The Indian Medical Degrees Act 1916
5. The Indian Medical Council Act 1956
6. The Medical Termination of Pregnancy Act 1971
7. The Pre-natal diagnostic Technique (regulations and prevention of misuse) Act 1994
8. The Registration of Birth and Death Act 1969
9. The Transplantation of Human Organs Act 1994
10. The Vaccination Act 1880
11. The Leprosy Act 1898
12. The Maternity Benefit Act 1961
13. The Mental Health Act 1987
14. The Waste Management and Handling Rules 1998
15. The Consumer Protection Act 1986
16. The Code of criminal procedure, 1973
17. The Drugs and Magic Remedies (objectionable advertisement) Act 1954
18. The Epidemic Disease Act 1897
19. The Leprosy Act 1898

20. The Personal Injuries (emergency provisions) Act 1962
21. The Pharmacy Act 1948
22. The Poisons Act 1919
23. The Protection of Human Right Act 1993

Medical Negligence

- Negligence is a legal concept and actionable for wrongful duty of practioners.
- Medical negligence is defined as want of reasonable degree of care and skill or wilful negligence on the part of medical practitioner while treating a patient resulting in bodily injury, ill health or death.

Type

1. **Civil negligence** - When a patient brings charges of negligence against doctor for monetary compensation for the damages suffered by him.
2. **Criminal negligence** - Criminal negligence is gross negligent acts that had caused death or severe harm to the patient. The doctor showed a gross carelessness or gross neglect for the life and safety of the patient. Ex. Operation on wrong limb, removal of wrong organ, perforating criminal abortion, leaving instruments in abdomen, mismatched blood transfusion.

Defences in medical negligence suits

As per Section 357 of CrPC, there is provision for compensation in addition to imprisonment or other penalty prescribed by the IPC. But on August 2005, the Supreme Court of India gave a judgment, that *"no doctor can be arrested simply on filling the complaint against him by any patient or relative of the patient. His arrest can only be there if needed for furthering the investigation or for collecting evidence or investigating officer think that doctor may run away to evade arrest"*. The judgment also gives the direction for the investigating officer before proceeding against doctor, "the investigating officer should obtain an independent and competent opinion preferably from a doctor in government service qualified in that branch of medical practice."

Medical records

It includes the information and data related to the admission, diagnosis, treatment, investigation, daily progress, operations, and consultations of a patient.

It contains: OPD cards, IPD cards, details of diagnosis (provisional and final), treatment protocol, investigation details by X-ray, USG and laboratory findings etc.

It should be adequate, appropriate and forensic complete. It is required both for patients or hospitals.

Requirement of record for Doctor	Requirement of record for Patient
1. Follow-up cases	1. Follow-up cases or taking treatment from another doctor
2. Planning for further treatment	2. Medico-legal cases
3. Evaluation of drug therapy	3. For life insurance policy purpose
4. For medical research	4. Medical negligence cases
5. Hospital audit	5. As a proof of disability
6. Legal purpose health and accident insurance	6. For third party claims under
7. Administration	
8. Insurance claims	

Preparation of medical reports

- A report may be requested by the police, prosecutors, coroners, judges, medical administrators, government departments, city authorities or lawyers of all types.
- A good rule of thumb is to ensure that, when medical records will need to be reviewed, written permission to access and use those records has been given, either by the individual themselves, or by an individual or body with the power to give that consent.
- The fact of a request, even from a court, does

not mean that a doctor can necessarily ignore the rules of medical confidentiality.

- Mandatory reporting of medical issues may be relevant in some countries; often these relate to terrorism, child abuse, use of a weapon and other violent crime.

Structure of a statement or report

- The basis of most reports and statements lies in the contemporaneous notes made at the time of an examination.
- A simple professional witness statement, included may be the doctor's professional address and qualifications should follow. The date of the report is essential and the time (s), date (s) and place (s) of any examination (s) should be listed, as should the details of any other person who was present during the examination (s).
- Medical abbreviations should be used with care and highly technical terms, especially those relating to complex pieces of equipment or techniques, should be explained in simple, but not condescending, terms.
- Autopsy reports are a specialist type of report and may be occasioned by the Coroner, the police or any other legally competent person or body. An autopsy report is confidential and should only be disclosed to the legal authority who commissioned the examination.
- Doctors must resist any attempt to change or delete any parts of their report by lawyers who may feel those parts re-detrimental to their case; any requests to rewrite and resubmit a report with alterations for these reasons should be refused.

Consumer Protection Act

Consumer Protection Act 1986 was introduced with the purpose to provide relief to the consumer against erring traders and manufactures. It was envisaged at that that there is a need of protection of consumer from wrong business practices. The Act was intended to provide cheap and speedy trial for the consumer benefit, as it was found that civil

courts are already burdened with heavy work and thus unable to provide speedy justice.

It is defined under law what are the obligation of manufactures and traders. Any consumer who feels that service is not provided to him for which he has paid is entitled for relief.

Under the Act, forums have been established at district level, state level and national level.

1. **District forum (Consumer forum) :** District forum has three members: the Chairman in either a sitting district and session judge or a retired one. Others are two eminent citizens, one being a lady.

The district forum can award a compensation up to Rs. 20 lakhs.

2. **State level forum :** Commonly called as State Consumer Redressal Commission has been set up at state level. It is presided over by a sitting High Court judge or retired one. Others are two prominent citizens, one being a lady member. Appeals against the judgements of district consumer forum are heard in State Consumer Redressal Commission. The State commission can award compensation up to Rs. One crore.

3. **National level forum :** In New Delhi, there is National Consumer Redressal Commission which is presided over by a sitting Supreme Court judge or retired one. Other members are prominent citizens, one being a lady member. Appeals against judgements of State Consumer Redressal Commissions are heard in this forum. The commission can award any amount of compensation. Appeal against the judgements of National Consumer Redressal Commission can be filed only in the Supreme Court.

Procedure of Filling a Complaint

The procedure of filing a complaint against deficiency of service by a trader is very simple. There is no need of any lawyer. No court fee is required. Application on the plain paper is sufficient

along with copy of goods purchased. It was envisaged at that time that judgement would be given in 90 days, but now also in consumer forums there is a lot of pendency resulting in inordinate delay.

The complaint has to be filed within two years of the cause of action. But court has the power to admit the case even after 2 years if it finds reasons of delay condonable.

The Act allows provisions for establishing consumer protection councils at state and central level working for the promotion and protection of the rights of consumer.

Following are the salient features of the judgement :

1. Hospitals and doctors which render service without any charge whatsoever to every person availing the service would not fall under the purview of "service".
2. If a hospital is charging a token amount for registration but providing free services to everyone, it would not be covered under the Act.
3. Services rendered by doctors and hospitals or nursing homes on payment basis fall under the ambit of the Act.
4. Doctors and hospitals or nursing homes which provides free service to some of the patients belonging to poor class but the bulk of the

service is rendered on to the patient on payment basis are also covered under the Act.

5. When a person has taken an insurance policy for medical treatment where under all the charges for consultations, diagnosis and medical treatment are borne by insurance company, in such cases a person receiving the treatment is beneficiary of the service which has been rendered by medical practitioner, the payment for which would be met by insurance company under the insurance policy. The service rendered to him by the medical practitioner would not be free of charge and would, therefore, constitute service as defined in the Act.
6. Government hospitals/dispensaries where services are rendered on payment of charges and also rendered free of charges to other persons availing such services would fall under the ambit of the Act.
7. Services rendered free in government hospitals. Dispensaries will not be covered under the ambit of the Act. Therefore, such government doctors/hospitals or dispensaries would be outside the purview of consumer forum. However, the services paid for, like pathological, radiological and other diagnostic procedures for which a fee is charged by the hospital will fall within the ambit of this Act.

Syllabus

1. Courts and their powers
2. Inquest, evidence and witnesses
3. Court procedures: summons, oath, recording of evidence and conduct money.
4. Conduct of a medical professional in the court of law.

Learning objectives

Describe the types of courts along with their powers. Describe - Inquest, Evidence, Witness, Summons, Conduct money and procedure of recording of evidence in a court of law. Describe the conduct of a medical professional in the court of law.

Total - 8 hours (Lecture :04 hour, Non-lecture: 04 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

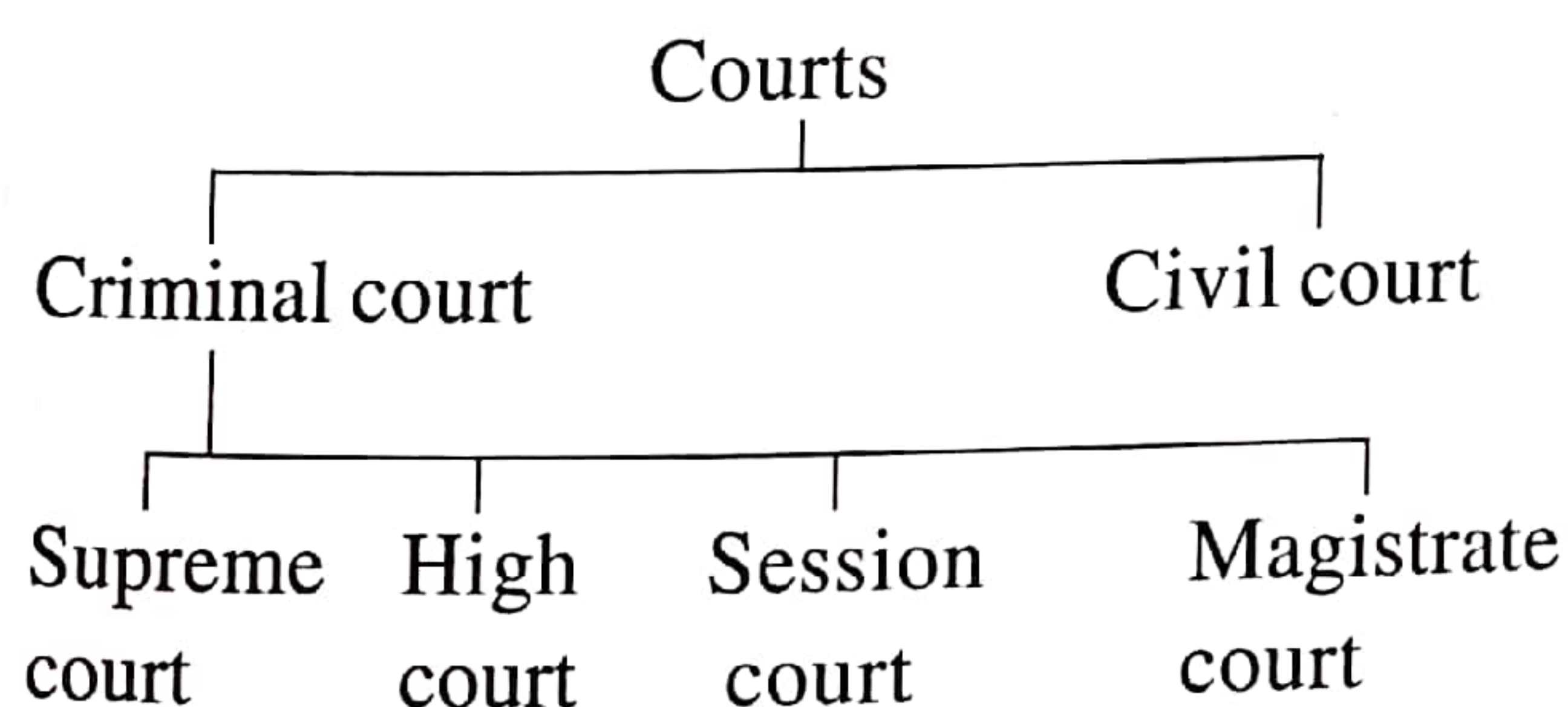
Courts and their powers

Courts in India

India judiciary is one of the most efficient Judicial systems in the world. The judiciary derives its powers from the constitution of India. The existence of Courts is required to check the misuse of the powers. It provides the Rights of citizen.

Court includes and signifies the person, legally authorised to record evidence and pass judgment.

There are two main legal systems are present -



A. Criminal courts - deals disputes between the State and individual as per IPC. It deals with offences which are considered to be against the public interest. e.g. Kidnapping, murder, poisoning, robbery, rape, suicide, criminal abortion, vehicular accident etc. State represents

as public prosecutor and accused is other party.

There are 4 types of Criminal court in India :

1. **The Supreme Court** – highest judicial tribunal in India and has power of superintendence over all other courts in India. It can pass any sentence usually considers appeals from lower courts. It can sustain or alter the punishment approved or awarded by high court.
2. **The High Court** - highest judicial tribunal of the State, usually situated in the capital of the State and pass any sentence prescribed by the law. Any person could appealed jurisdiction passes by Session court.
3. **The Sessions Court** – Located in district headquarter and could pass any sentence authorized by law.
Additional Sessions judge and assistant session judge appointed by high court passes the sentences as per IPC in this court.
4. **The Magistrate Court** –
 - a. **Chief Judicial Magistrate (CJM) or Chief Metropolitan Magistrate** : This is first class

officer appointed by high court in Metropolitan area. It can pass any sentence (except a sentence of death or of imprisonment for life or of imprisonment exceeding 7 years), fine without limit.

b. **Judicial Magistrate (First Class)/ Metropolitan Magistrate** : This could pass sentence of imprisonment for a term not exceeding 3 years or of fine not exceeding 10,000, or both.

c. **Judicial Magistrate / Second Class magistrate** : State government may establish after permission of high court. This could pass sentence of imprisonment for a term not exceeding 1 year or of fine not exceeding 5000, or both.

Juvenile courts are special criminal courts which try offences committed by juvenile (below 18 Years of age).

B. Civil courts - deals with disputes between individual including those of alleged negligence, contractual failure, debt, land disputes, divorce, education, services, marriage and libel or slander.

Decisions made by judges are referred to as 'common law' or 'case law'. In both civil and criminal trials, the person against whom the action is being taken is called the defendant; the accuser in criminal trials is the state and in civil trials it is the plaintiff.

Consumer courts : It deals with consumer disputes. Their powers and procedures are as like civil courts.

Consumer court	Fine limit
District forum	Less than 20 lac
State commission	20 lac -1 crore
National commission	More than 1 crore

* **Coroner's courts**: It was there only in Mumbai and Kolkata and dealt with inquest only, but now it is abolished at both places and there is no coroner's court in India.

Inquest

- An official process that tries to find out how somebody died, or

- A judicial inquiry to ascertain the facts relating to an incidence, or
- A discussion or investigation in to something that has happened.

It is conducted by Judge, jury or government official, it may require autopsy carried out by a medical examiner.

Types of inquest

1. Police inquest
2. Magistrate inquest
3. Coroner's inquest – was previously carried out but not now
4. Medical examiner's System

Police inquest

- Under Sec 174 CrPC.
- Police officer is the investigating officer, which collects information from public, village chawkidars, informer, public places and others. After informing nearest executive magistrate, he goes to site of crime or offence and conduct the inquest. In presence of two or more respectable inhabitants / Panchas, prepare the report (**Panchnama**) of apparent cause of death. Panchanama is signed by police officer and witnesses. If no any suspect found, then body is handed over the relatives otherwise sent for post-mortem examination to find out the cause of death.

It is done in following conditions:

- a. Death by suicide
 - b. Murder or killing by animal or machinery
 - c. Death by accident
 - d. If any suspected and committed person killed other
- Investigating officer may summon the person and that person must attend and give answer of inquiry, otherwise he may punished under IPC section 179.

Magistrate inquest

- Under Sec 176, CrPC
- Carried out by executive / district / sub-divisional magistrate, it is considered superior to police inquest.

- It is done in following conditions:
 - a. Death in prison, reformatories, Brostal school
 - b. Death in police custody under police interrogation
 - c. Death due to police firing
 - d. Dowry death (less than 30 years of age and within 7 years of marriage)
 - e. Exhumation
 - f. Death in psychiatric hospital
 - g. Any person dies, disappears or rape is alleged
 - h. If government wants for any case.

Medical Examiner's system

It is done in USA (not in India), where a medical person is appointed to hold an inquest. He visits the scene of crime and able to collect first-hand evidence, interpreted them by applying the knowledge of medical science. The autopsy may be conducted to find out the result. This system is better than the other inquest where non-medical person conducts. He submits his report to the district attorney.

Difficulties in detection of crime

- Delay in information of crime
- Decomposition of vital evidences
- Rapid disposal of dead body due to religious custom
- Lack of medical knowledge by police officials and public on crime spot.

Medical Evidence

It could be a statements and reports:

- A statement in a criminal case is a report that is prepared in a particular form so that it can be used as evidence.
- A statement provided when acting as a professional witness will be based on the contemporaneous notes (notes or records made at the time of examination), and it is important that the statement fairly reflects what was seen or done at the time.
- A statement may be accepted by both defence

and prosecution, negating the need for court attendance.

Medical evidence

Medical evidence is written documents or oral report by medical science which help the court, to decide a case.

Type

- a. **Written** – Medical certificates, medico-legal reports, dying declaration, dying deposition.
- b. **Oral** – direct and indirect.
- c. **Circumstantial.**

Medical certificates

- It is issued by medical officer at request of patient or his relatives for sickness, fitness, vaccination, birth etc.

Medicolegal reports

- It is prepared by registered medical practioners or a doctor at request of an investigating officer or court. It is considered as evidence when doctor attend the court to testify the fact under oath.
- e.g. medico-legal report of injury, age, poisoning, impotence and post-mortem etc.

Dying declaration

- In presence of an executive magistrate, doctor, village head man or any other person, if a person recorded his statement written or verbal, who likely to die due to unnatural act done on his body, saying his circumstances.
- It is recorded in presence of two disinterested witness.

Dying deposition

It is the statement recorded by magistrate of a person on oath in presence of accused or his lawyer, who allowed cross-examining the witness. It retains its full value even the person not dies.

Oral Evidence or Parole

- When evidence given orally under oath in a court of law.
- This is superior to written evidence because in

court there is cross-examination is possible.

Circumstantial evidence

- When an evidence is collected from the circumstances or surroundings of a case.
- e.g. Suicidal note, finger print, foot print, bullet etc.

Witness

- Witness is a person who gives sworn testimony or evidence in the court of law for any fact under inquiry, or
- A person who gives evidence under oath in a court of law is called Witness.

Types

There are two types of witnesses:

1. **Common witness** - one who testifies or gives evidence to the facts observed or heard or perceived by him.
2. **Expert witness** - a person who, by virtue of his professional training, is capable of forming opinions or draws conclusions from the facts observed by him or noticed by others. e.g. doctor, handwriting expert, fingers print expert, ballistic expert, and chemical analyzer.

The role of an expert witness should be to give impartial and unbiased assessment or interpretation of the evidence that they have been asked to consider.

Offenses

The offenses may be:

1. **Cognizable** - an offense in which a police officer can arrest a person without warrant. e.g. rape, murder, dowry death, ragging etc.
2. **Non-cognizable** - an offense where a warrant from the Magistrate is necessary for arrest of a person, without which a police officer cannot arrest a person.

Procedure of the Court

It includes:

- a. Summons
- b. Oath

- c. Recording of evidences – examination in chief, cross examination, re-examination and court's question.

Summons or Subpoena

- It is a legal document compelling attendance of witness in a court of law under penalty, in a fixed day and place for giving the evidence. It is issued by the court in writing, in duplicate, signed and sealed by preceding officer of the court.

Oath

- It is declaration required by law and is compulsory to take by every witness, who is responsible for evidence given.
- By putting hands on religious books (Geeta (Hindu), Quran (Muslim) and Bible (Christian)) say "I swear by God that I shall speak truth, the whole truth and nothing else but truth."
- If witness evidence is found false (called **Perjury**) taking even oath, he or she is punishable with crime under section 193 IPC, imprisonment up to 7 years and fine also.
- A child below age of 12 years is not required to take oath. Oath is necessary in wound certificate, post-mortem certificates and medical certificates.

Recording of evidences

- a) **Examination in chief** – When the witness will be the first to examine them under oath.
- b) **Cross examination** – When this questioning is completed, the other lawyers will have the opportunity to question the witness; this questioning will test the evidence that has been given.
- c) **Re-examination and court's question** - The final part of giving evidence is the 're-examination'. Here, the original lawyer has the opportunity to clarify anything that has been raised in cross-examination but he cannot introduce new topics.

Conduct money

- Travelling expense to reach the court for

summons in civil cases and it is paid by the party calling for evidence.

Conduct of a medical professional in the court of law

Doctors appear in courts in three different situations :

1. **As an expert witness** to support a medical opinion already secured, or to explain a medical condition of a party or witness in litigation, both civil and criminal, as respondent in actions complaining of medical negligence, or

2. **As accused** in a criminal case for commission of offences under one or other penal laws.
3. A medical professional acquiring a law degree wishing to **pursue practice** as a lawyer.

Duties of the Doctor in the Witness Box

- Be well prepared with the details of evidence before entering the box.
- Take all records and relevant reports that may have to be quoted in the box (original notes, autopsy reports, X rays, photographs, copy of death certificate, special reports on swabs and smears etc.)

Syllabus

1. Identification data
2. Age
3. Race, religion, sex.
4. Moles, tattoos, scars, occupational marks & hairs.
5. Hand writing, dactylography, DNA typing and superimposition

Learning objectives

1. Define identification and enlist the identification data. Describe the method of estimation of age based on Teeth, ossification of bones, secondary sexual characteristics and general development.
2. Describe the medico-legal importance of age, tattoo marks and occupational marks.
3. Describe the medico-legal importance of race, religion, sex, moles and hair.
4. Describe the medico-legal importance of handwriting, dactylography, DNA typing and superimposition as an identification data.

Total - 4 hours (Lecture :02 hour, Non-lecture: 02 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- Yes

Identification

Definition

- Identification means recognition of individuality.
- The action or process of identifying someone or something or the fact of being identified is called Identification. It is the unique features of someone.

Types of Identification

1. **Complete** – It is absolute identification and refers to the perfect fixation of individuality of a person.
2. **Partial** – It is incomplete identification and implies ascertainment of only some features or characteristics regarding the identity.

Importance of Identification

1. Loss of identity, either deliberate (e.g. because someone does not wish their identity to be

known, or wishes to conceal the identity of another) or unintentional (e.g. in mass disasters, etc).

2. Proper identification of a body is one of the key questions to be answered when a body is found and in the investigation of any death and forms the first part of a Coroner's inquest.

Identification process

A. In Living Persons:

1. For Civil cases:

- a. In impersonation or false personification cases in relation with: Inheritance of property, pension, life insurance, voting rights, passport etc.
- b. Disputed identity in cases of divorce or nullity of marriage
- c. Disputed sex
- d. Missing person

e. Lost memory patients.

2. For Criminal cases:

- Identification of accused in criminal offenses of assault, murder, dacoity, sexual offenses etc.
- Absconding soldiers
- Interchange of new born babies in hospital
- Criminal abortion
- To fix-up age of criminal responsibility and majority
- Impersonation in criminal cases.

B. In Dead Persons

Identification is required for the person who died in mass disaster – flood, air-crash, fire victims, exhumation, explosion and bomb-blast injuries, and decomposed bodies and in skeletal remains.

At least two identification marks should necessary for identification in medico-legal examination.

The detailed assessment of the dead for evidence of identity is a specialized task for a multi-professional team that includes the forensic pathologist, forensic odontologist, anthropologist, radiologist, and other experts.

Corpus delicti (body of offence/ crime or essence of crime)

- Corpus delicti means the fact of any criminal offence, include body of victim. In homicide cases.
- It is done by: Identification of dead body i.e. the identity of victim (i.e. the person who had died).
- It is important when death was caused by the criminal act and for establishment of identity of victim.

Identification Criteria

- Primary – by unique medical characteristics, fingerprints, DNA and dental features.
- Secondary - include deformity, marks and scars, X-rays, personal effects and distinctive clothing.

Data for identification

- Religion
- Race
- Sex
- Age
- Stature
- Dactylography
- Foot prints
- Cheiloscopy
- Tattoo marks
- Scars
- Deformities
- Anthropometry
- Teeth
- DNA typing
- Blood group and HLA typing
- Others-Complexion, hair, handwriting and signature, Occupation marks, gait etc.

Race

- Person self identification with one or more social group (population concept).
- It is biological grouping within human species

Type of races - On the basis of (Clothes, Complexion, Eyes, Hairs, Physical features, Teeth and Skeletal)

- Caucasians or Caucasoid
- Mongolians or mongoloids
- Negro or Negroid

Features	Caucasians	Mongolian	Negro
Complexion	Fair	Yellowish	Black
Eyes (Iris colour)	Gray or blue	Black	Black
Forehead	Raised	Inclined backward	Small and compressed

Nasal aperture	Narrow and elongated	Rounded	Broad
Nose	Sharp	Flattened	Blunt
Face	Small	Large and flattened bone Oblique	Projected Jaw, Prominent molar teeth
Hard palate	Triangular	Large and flattened	Rectangular
Upper extremity	Normal	Small	Large forearm and small hand
Lower extremity	Normal	Small	Large Leg, wide feet
Hairs	Straight, brown	Straight, black	Thick, curly, spiral

Religion

Religion can be a central part of one's identity. It is the sense of group membership to a religion that forms a specific type of identity.

Sex

Sex of a person can be determined by:

- Physical/morphological examination
- Microscopic examination – by Barr body or

Sex chromatin, Davidson body (drumstick appearance), Karyotyping

- Hormone assay – Androgen from male and Oestrogen from female
- Gonadal biopsy - confirmatory method of determining sex
- DNA profiling
- Radiological examination - based on the calcification pattern of costal cartilage

Physical appearance

Features	Male	Female
Built	Muscular and strong	Less muscular, delicate
Moustache, Beard	Present	Absent/rudimentary
Hair on pinna	Present	Absent
Body hairs	Grow over chest, limbs	Not significant
Breast	Rudimentary	Well developed
Thyroid cartilage	Prominent	Less prominent
Shoulder and hip	Shoulder Broader than hip	Hip broader than shoulder
Chest and abdomen	Chest dimensions more	Abdomen dimensions more
Waist	Not well defined	Well defined
External genitalia	Scrotum, testis and penis	Labia, clitoris, and vagina
Internal genitalia	Vas deferens, seminal vesicle prostate	Ovaries, Fallopian tube, uterus

DNA profiling

- DNA profiling is the process of determining an individual's DNA characteristics, which are as unique as fingerprints.
- The primary purpose of forensic DNA

profiling is to obtain a DNA 'fingerprint' from a biological sample and compare this to profiles obtained from DNA from a crime scene, an individual or profiles stored on a database.

- DNA testing can help solve crimes by comparing the DNA profiles of suspects to

offender samples. The collection of blood, semen, saliva and hair etc. samples from convicted criminals and suspects. DNA profiles are then kept on a database.

- The chances of two unrelated individuals sharing the same sequence is one in a billion, or higher. Only uni-ovular twins have the same sequences.

Stature

Stature means height of a person, that increases progressively and becomes maximum between age of 21 - 25 years. After that, it is shortened by 2.5 cm due to thinning of intervertebral discs. In morning, the height is more comparing to afternoon and evening. Before rigor mortis in a dead body, soon after death due to primary relaxation of the muscles, the body length may be more by 2-2.5 cm and later get shortened.

Forensic odontology

Examination of dental structures:

- The forensic odontologist is of prime importance in mass disasters where trauma is likely to make visual identification impossible.
- The great advantage of dental identification is that the teeth are the hardest and most resistant tissues in the body and can survive after total decomposition and even severe fire, short of actual cremation. Pre-existing dental records and charts and radiographic images can be compared with examination of teeth of the deceased. Where no previous records are available, examination of the mouth and the teeth can still give some general information on age, sex, diet and ethnic origin.

Teeth

- Temporary or deciduous teeth - 20 in number. In each jaw - Incisor-4, Canines-2, Molars-4
- Eruption of temporary teeth - 2 to 2½ years.
- The temporary teeth begins to fall - at about the 6th or 7th year after eruption of 1st permanent molar.

- In children, mixed dentition (temporary + permanent) remains at 6-12 years of age.

Total number of permanent teeth

- Total permanent teeth - 32
- In each jaw - Incisor - 4 Canines - 2
Premolars - 4 Molars - 6

Classification and eruption of Deciduous teeth

No.	Tooth	Eruption
1.	Central incisor (a) Lower (b) Upper	(a) 6-8 months (b) 7-8 months
2.	Lateral incisor (a) Lower (b) Upper	(a) 7-9 months (8 months) (b) 10-12 months (9 months)
3.	First Molar	12-14 months
4.	Canine	17-18 months
5.	Second Molar	20-30 months (24 months)

- Total temporary teeth eruption 20

Classification and eruption of permanent teeth

No.	Tooth	Eruption
1.	First molar	6-7 years
2.	Central incisor	6-8 years
3.	Lateral incisor	8-9 years
4.	First bicuspid (Premolar)	9-10 years
5.	Second bicuspid (Premolar)	10-11 years
6.	Canine	11-12 years
7.	Second molar	12-14 years
8.	Third molar	17-25 years

- Total eruption of permanent teeth 32



Dactylography

- Dactylography is derived from greek word daktylose-finger ,graphein- to write
- The scientific study of fingerprints is known as dactylography. It is a method of identification based on unique epidermal ridge pattern on the tips of fingers.
- Synonym-Fingerprinting, Dermatoglyphics, Galton system of identification

Use and importance

1. It is used as technique to detect crime
2. It is a most accurate and unfailing method of positive identification.
3. No Two Individual will have identical fingerprints
4. It is better method of identification than DNA profiling. DNA profiling would be same in identical twins but fingerprints are different.
5. Fingerprints remain permanent throughout life and even after death and in advance stage of decomposition.
6. Fingerprints have general characteristic ridge patterns that permit them to be systematically classified.
7. Pattern can be easily emailed and printed, enabling intercontinental criminals can be caught easily.

Morphological characteristics

Established by matching the parameters that can be measured or seen on an individual with the same parameters that were known to apply to, or to be present on, a named individual.

In both the living and dead, the height, weight and general physique need to be recorded and compared. Hair colour and length, including bleaching or dyeing, etc.

Tattoos and body piercings

The main use of tattoos and piercings in forensic medicine is in the identification of the bodies of unknown persons. Decomposing bodies should be examined carefully for tattoos, which may be

rendered more visible when the superficial desquamated stratum corneum is removed. Also note the site and type of body piercing.

Identity of decomposed or skeletalized remains

Phalanges, carpal and tarsal bones can be extremely difficult to positively identify as human because some animals bones almost identical to the human hand.

The skull and the pelvis offer the best information on sex and the examination by an anthropologist or anatomist is vital.

Body implants

May either relate to the cause of death or may simply be an incidental finding. Most body implants (e.g. pacemakers, joint replacement) bear a unique reference number which identify the maker. These and other unique medical data are often useful in establishing identity.

Where pre-mortem clinical radiographs are available, the comparison of these with the post-mortem films may give a definite identity. If a skull X-ray is available, comparison of the frontal sinus patterns is incontrovertible as no two people have the same frontal sinus outline.

Age estimation in the living

- Only few doctors have the knowledge or skills of assessing age or be aware of the limitations. The essential element of any age estimation procedure is to ensure that it complies with, and fulfils, all local and/or national legal and ethical requirements.
- Underestimation of age is unlikely to raise any issue in relation to an infringement of human rights (as younger persons tend to be treated better in law) but an over-estimation of age can have adverse effects.
- The 4 means of assessment that should be used now to estimate age in the living are:
 1. Social and psychological evaluation.
 2. External estimation of age.

3. Skeletal estimation of age (not visually but relies on technology to assist with informed consent).

4. Dental estimation of age.

Evaluation must be undertaken by a qualified clinician. External estimation of age should use Tanner staging to assess child maturity however; pubertal and post-pubertal individuals require a radiographic investigation.

Mass disasters

- A mass disaster requires appropriate collection

of forensic samples.

- Fingerprints and DNA samples can be obtained from personal items.
- Body recovery teams will identify where the deceased are and then once identification evidence has been collected this will be presented to the Identification Commission who will decide if it meets the standards required to confirm identity.
- Multiple deaths are caused by some form of disaster, the process of Disaster Victim Identification (DVI) should be established.

Syllabus

1. Death
2. Signs of death.
3. Medicolegal autopsy and exhumation.
4. The Transplantation of Human Organs and Tissues Act (THOTA).

Learning objectives

1. Define death and describe the stages and modes of death. Explain the immediate changes following death.
2. Enlist and explain the early changes following death. Describe Algor mortis, rigor mortis and livor mortis with regards to their definition, mechanism, modifying factors and medico legal importance.
3. Enlist the late changes following death and describe the definition, modifying factors and medico legal importance of putrefaction, mummification and adipocere formation.
4. Define Autopsy and describe its types, its objectives, rules and procedure along with exhumation.
5. Describe the Transplantation of Human Organs and Tissues Act.

Total - 8 hours (Lecture :06 hour, Non-lecture: 02 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- Yes

Thanatology - The branch of science which deals with study of death in all aspects. Death denotes death of human being (46 IPC).

Death

Definition of death

- It is a process in which cellular metabolic processes in different tissues and organs cease to function at different rates.
- It is cessation of life or cessation to exist.

Types

- 1) Somatic death (systemic death or clinical death) and
- 2) Molecular death (cellular death).

1. Somatic death

- It is the complete and irreversible stoppage of the circulation, respiration and brain functions (bishop's tripod of life).

- Somatic death is due to stopped aerobic processes.
- Somatic death is associated with immediate signs of death.
 - Permanent and complete cessation of function of brain and flat EEG with no response to external stimuli; i.e. brain death.
 - Permanent and complete cessation of function of heart and flat ECG.
 - Permanent and complete cessation of function of lungs.
- In Somatic death, muscles and pupils respond against external stimuli.
- Duration of body cells die:
 - (i) Skin and bone = die days after somatic death.
 - (ii) White blood cells = 12 hours after cardiac arrest.

(iii) The cortical neuron = 3–7 minutes.

Clinical criteria for diagnosis of brain death

1. Coma (widespread cortical destruction) : There is unresponsiveness to all form of stimuli. Stimuli do not produce any motor response except spinally mediated reflexes, i.e. spinal reflexes may be intact e.g. deep tendon reflex.
2. Absent of brainstem reflexes : Pupillary reflex, Oculove-stibular reflex, corneal reflex, pharyngeal and tracheal reflexes.
3. Signs of brain stem (lower) destruction : Apnoea, pulse rate invariant and unresponsive to atropine.

2. Molecular death (Cellular death)

- It occurs after somatic death.
- It refers to death of all individual cells.
- It occurs when even an aerobic processes stop, due to non availability of ATP.
- Features of this stage:
 - a) Muscles do not respond to stimuli.
 - b) Pupils do not respond to stimuli or drugs.
 - c) There are early sings and late signs of death.
 - **Early signs:** Changes in skin and eye, cooling of the body, Post-mortem lividity, changes in muscles e.g. primary relaxation, rigor mortis.
 - **Late signs:** Decomposition (putrefaction), Adipocere formation and Mummification.
 - Molecular death of various organs occur at different intervals—

Organ	Interval
Nervous tissue	5 minutes
Liver	15 minutes
Heart	45 minutes
Kidney	1 hours
Muscles	3 hours
Cornea	6 hours
Blood	6 hours

Medicolegal Importance of death

1. Declaration of death – declaration of death

has importance for cremation or burial

2. Certification of death –to certify death of a person
3. Disposal of the body
4. Organ transplantation – cadaveric organs or tissues for transplantation cannot be retrieved from a person unless the person is certified to be dead.
5. Presumption of death – vide infra.

Mode of death

An abnormal physiological state that pertained at the time of death is known as mode of death.

It is -

1. Coma
2. Asphyxia
3. Syncope

1. Coma

- It is an unconscious state of a person characterized by complete insensibility or unarousability.
- Symptoms: No any response to any sort of stimuli.
- Causes: Head injury, intracranial haemorrhage, encephalitis, meningitis, diabetic ketoacidosis, uraemic coma, hepatic encephalopathy, opium/ barbiturate poisoning, alcohol intoxication, epilepsy, heat stroke.

2. Asphyxia

- It is a state in living organism in which there is acute lack of oxygen available for cell metabolism associated with inability of body to eliminate excess of carbon dioxide.
- Causes :
 - (a) Mechanical – Hanging, strangulation, throttling, drowning, choking
 - (b) Toxic – Opium, CO, Cyanide poisoning
 - (c) Pathological – Consolidation, pleural effusion
 - (d) Environmental – High altitude, person trapped in well, respiration in enclosed space.

3. Syncope

- It results from stoppage of functioning of heart with consequent cessation of circulation.

- Symptoms - loss of consciousness with postural collapse due to an acute decrease in cerebral blood flow.
- Causes: myocardial infarction, stenosis, pulmonary hypertension, anaemia etc.

Manner of death

- The way or design in which the cause of death comes into being.
- Classification :
 1. Natural
 2. Unnatural –
 - Homicide
 - Suicide
 - Accident

Suspended animation or Sudden death

- It is a condition of the living body in which all the activities that characteristics of life such as movement, respiration and beating of the heart are temporarily suspended giving the appearance of death according to clinical diagnosis.
- It is temporary suspension of the vital functions; and is apparent death, i.e. signs of life are not found.
- The condition lasts from few seconds to 1/2 an hour or more.
- It may be found in:
 - a. Electrocution
 - b. Drowning
 - c. Cholera
 - d. After anaesthesia
 - e. Shock
 - f. Sunstroke
 - g. Cerebral concussion
 - h. Narcotic poisoning
 - i. Newborn infants
 - j. Yogis (voluntary)

Postmortem changes after death

The post-mortem changes takes place in the body after death and help us in estimation of approximate time since death.

1. Immediate changes after death

- Stoppage of function of nervous system
- Stoppage of respiration
- Stoppage of circulation

2. Early changes after death

- Changes in eye
- Changes in skin
- Cooling of body
- Post-mortem lividity
- Rigor mortis and changes in muscle
- Changes in body fluid

3. Late changes after death

- Putrefaction or decomposition
- Adipocere
- Mummification

Signs of death

1. Immediate signs (due to somatic death).
2. Early signs (due to molecular/cellular death).
3. Late signs (decomposition of decay after molecular death).

1. Immediate signs of death

A) Permanent and complete cessation of functions of lung :

- There is complete cessation of respiration for more than 5 minutes, i.e. there is no breath sound on chest or larynx for 5 minutes. Respiration can stop for short duration without death e.g. voluntarily, drowning and cheyne-stokes breathing.
- Tests for confirming cessation of respiration are :

i) **Feather test** No movement of feather if held in front of nose.

ii) **Mirror test** Mirror held in front of nose does not show vapors and blurring.

iii) **Winslow's test** No movement of reflection of light shone on mirror/surface water in bowel, kept on chest.

B) Permanent and complete cessation of function of heart and flat ECG :

- i) There is complete stoppage of heart beat for more than 3 minutes with flat ECG.
- ii) Tests for confirming cessation of circulation are :

- **Magnus test (ligature test) :** Fingers fail to show congestion and swelling to a ligature applied at their base.

- **Diaphanous test (Transillumination test) :** Failure to show redness in finger web spaces on transillumination from behind.

- **Leard's test :** Failure to produce yellowish green discoloration of skin on injection of fluorescein dye.

- **Finger nail test :** No blanching and filling of blood on applying pressure and release of pressure.

C) Permanent and complete cessation of function of brain function and flat EEG.

There is complete cessation of function which leads to insensibility, unresponsiveness to external stimuli or internal needs, loss of muscle tone and flat EEG.

2. Early signs of death

A) Skin : Loss of translucency and elasticity skin, becomes greyish white, lips become dry hard and brownish

B) Eye : The changes in eye are :

- Abolition of pupillary and corneal reflexes.
- Cornea becomes hazy and opaque.
- Cellular debris and mucus form yellow triangles at each side of iris/cornea.
- Decrease in intraocular pressure (IOT) cause flaccidity of eye ball. Normal IOT is 14-25 mmHg. It is 12 mm Hg immediately after death, 3 mmHg at 3 hours after death and 0 at 2 hours after death.
- There is increased in level of potassium, ascorbic acid and lactic acid in vitreous humour. Potassium is the most useful

component of vitreous humor for determining the time since death.

- Retinal blood vessels are seen as continuous line in living person. After death following changes are seen :
 - (a) Dotted appearances (1-2 hours after death)
 - (b) Segmented or rail road appearance (2-3 hours after death)
 - (c) Pale optic disc (>3 hours after death).

3. Algor mortis (cooling of body)

4. Livor mortis (postmortem lividity or postmortem staining).

5. Muscular changes : Primary relaxation, Rigor mortis, secondary relaxation.

Algor Mortis (Cooling of dead body / Chill of Death)

- After death, dead body behaves like an inert substance and therefore, if atmosphere temperature is low, body loses its heat by conduction, convection, radiation and evaporation, so as to attain the atmospheric temperature, i.e. the body cools.

- No cooling of dead body occurs if atmospheric temperature is higher than that of body.

- Cooling of body starts 1/2 to 1 hour after death. There are varying opinions about rate of cooling of dead body :

i) It is 0.5-0.70 C⁰/hour, so that body attains atmospheric temperature in 16-20 hours after death. In temperature climate, the rate of fall is about 1.50/hour.

ii) Cooling is faster in initial period, when the temperature difference between body and atmosphere is maximum-

a. First 30-45 minutes - No temperature fall (isothermic phase)

b. First 1-6 hours - 1.5-20 C⁰/hour.

c. 6-12 hours - 0.9-1.20 C⁰/hour

d. After 12 hours - 0.4-0.60 C⁰/hour

iii) Rate of cooling is related to difference in temperature and its surroundings (environment).

- iv) In the first 2 hours average rate fall of temperature is roughly half this difference. In next 2 hours the temperature falls is at half this rate and in subsequent 2 hours, at quarter this rate.
- v) Most common site for recording temperature is the rectum. Thermometer is inserted in rectum around 8-10 cm for 2 minutes. Other sites for recording temperature are nose, ear (external auditory meatus), vagina and under liver.

Factors affecting cooling of body

1. Difference in temperature between body and medium : fall is rapid when difference is great.
2. Build of the cadaver : heat loss is proportional to weight of body and to its surface area; children and old people cool more rapidly than adults.
3. Physique of cadaver : fat bodies cool slowly (fat is a bad conductor) than lean bodies.
4. Environment of the body : in well-ventilated room body cools rapidly; humid atmosphere-cooling rapid; cold water-cool rapidly; running water-cool rapidly; fresh water/sea water-cool rapidly and sewage water-cool slowly.
5. Covering around body; clothed body-cool slowly (clothes are bad conductors of heat).

Medicolegal importance of algor mortis

- i) It is a sign of death.
- ii) Time since death may be determined and algor mortis is the most important indicator to determine the time since death during first 24 hours.

Postmortem caloricity

Normally, temperature falls after death. But in some situations, for initial 2-3 hours the dead body may gain heat i.e. postmortem caloricity.

This may be seen in :

- i) Due to disturbed heat regulation: Sun-stroke (heat stroke), pontine haemorrhage.
- ii) Due to heat production by muscular activity :

- tetanus, strychnine poisoning, asphyxial death.
- iii) Acute bacterial or viral infections : pneumonia, septicemia, liver abscess, peritonitis, typhoid, nephritis, meningitis, cholera etc.
- iv) Very high atmospheric temperature.

Postmortem staining (Livor mortis or Postmortem Lividity or Hypostasis)

- Darkening of death.
- It refers to discoloration of skin and internal organs after deaths due to accumulation of fluid blood in toneless capillaries and small veins of dependent part of the body.
- As dead body behaves like an inert substance, therefore there is gravitational flow of blood to the dependent parts of body, causing stagnation of blood in toneless capillaries and small veins, causing bluish purple staining of these parts.

Important features

1. It does not appear elevated, above the surface.
2. It is an early sign of death. It starts at about 1 hour, becomes a series of mottled patches within 1-3 hours and these patches increase in size to coalesce in about 3-6 hours. After 6-12 hours, lividity is fully developed and fixed (unchangeable), i.e. primary lividity. It ends when putrefication sets in. Fixation of lividity is due stagnation of blood in distended capillaries and venules (not due to coagulation of blood).
3. If the position of body is changed, after development of lividity but before it becomes fixed, these patches will disappear and fresh ones will develop in the new dependent areas (secondary lividity), but lividity to a slight degree will remain.

Rigor Mortis / Cadaveric rigidity

- rigor = rigidity,
mortis = of death
- Rigor mortis is the stiffening of muscle after death along with shortening of muscle fibres. When rigor mortis is developed completely,

the body and joints become stiff with flexion attitude of upper limb muscles.

- Appearance of rigor mortis indicates death of individual cells (i.e. molecular death has occurred).

Onset of Rigor Mortis

- Rigor mortis occurs in all sort of muscles i.e. striated, smooth and cardiac muscles
- It occurs earlier in involuntary muscle then voluntary muscle.
- In summer season, rigor mortis first appear in cardiac muscle at the end of first hour after death. In case of voluntary muscle, rigor mortis first appears in muscle of eye lids (orbicularis oculi).
- Rigidity spreads gradually within next few hours, chronologically, in the muscles of face, neck, jaw, trunk, upper limbs (from shoulder to hand), and lower limbs (from hip to foot). It appears lastly in the small muscles of hand and feet.

Disappearance of rigor mortis

- It disappears in the same fashion as followed in onset i.e. it disappears first in the muscles of face, neck, jaw, trunk, upper limbs (from shoulder to hand), and lower limbs (from hip to foot).
- It disappears lastly in the small muscles of hand and feet.

March of rigor or Rule of 12

It is generally considered that it takes about 12 hours after death to develop rigor mortis, remains for another 12 hours and takes about 12 hours to pass-off.

Factors affecting rigor mortis

1. Physique of the person—In thin built with weak musculature person appear early and passes off early.
2. Season – In summer season with high atmospheric temperature - appear early and passes off early

3. Cause of death –

Cause	Rigor mortis
Electrocution, cancer, convulsions, hyperpyrexia, metabolic acidosis, Uremia, hot environment	Early onset and passes off early
Asphyxia, apoplexy, cold environment, hypothermia	Delayed onset
Strychnine, hydrocyanic acid poisoning	Rapid onset but stays longer

4. Condition of muscles before death—In relaxed muscle- occurs late, In exhausted muscle - occurs early and passes-off early.

Medicolegal Importance

1. It is a sign of death
2. Time since death can be estimated
3. Indicates position of the body
4. Differential diagnosis with cadaveric spasm, heat stiffening, cold stiffening

Cadaveric Spasm (instant rigor/ sudden stiffening)

Cadaveric spasm is a state where muscles or group of muscle, instead of going under primary relaxation after death, go into a sudden state of stiffening.

Cause - not known but is usually associated with violent deaths coupled with emotional disturbances at the time of death.

- In Cadaveric spasm, the muscles do not undergo primary stage of relaxation; rather they get stiffened at the moment of death eg. in case of drowning deaths, the weeds/grass/mud/sand may be tightly grasped in hand or in case of suicide by shooting with firearm, the weapon may be firmly grasped in the hand.
- The condition commonly involves only a group of muscles of hand or limb but rarely whole body may be involved.

Differences between rigor mortis and cadaveric spasm

Features	Rigor mortis	Cadaveric spasm
Time of onset	1-2 hours after death	Immediate
Muscles involved	All muscles are involved gradually	Usually group of muscles (like hand) are involved
Degree of stiffness	Moderate	Strong
Predisposing factors	None disturbance	Excitement, fear, emotional
Mechanism	Breakdown of ATP	Not known
Help to know	Time since death	Manner of death

Medicolegal Importance

1. It indicate that person was alive at the time of instantaneous rigor
2. If weeds, mud, grass particles are found grasped in hand in a drowned body, it indicates antemortem nature of drowning.
3. Presence of some object like knife, button, torn cloth etc helpful in investigation to relate with crime.

Adipocere

- Adipocere is modified form of decomposition characterized by formation of soft, waxy material in the dead body.
- Most commonly seen in bodies found in wet conditions.
- In early stages of formation, adipocere is a pale, rancid, greasy semi-fluid material with a most unpleasant smell. When fully formed, adipocere is a grey, firm, waxy.

Skeletalization

- By autolysis and putrefaction or eaten by animals.
- In a formally buried body, the soft tissues will be absent by 2 years. Examination of the bone marrow space may reveal residual organic material that can sometimes be suitable for specialist DNA analysis.

Mummification

- It is modified form of decomposition characterized by drying desiccations of tissues

under the conditions of high environmental temperature, low humidity and good ventilation in which the body tissues are converted into dark, hard and shrivelled appearance.

- It may be natural in dry climates.

Decomposition

- Autolysis (due to body enzymes).
 - Putrefaction (due to bacterial normal flora).
- First part of the body that will undergo putrefaction is Cecum.

Death certificates (D.C.)

- It is documentation for recording and certifying deaths.
- According to the Registration of Birth and Death Act 1969 – it shall be duty of Registered Medical Practitioner or Medical officer, in-charge of the hospital to give information to the Registrar in respects of births and deaths occurring in a hospital [Section 8 (b)].
- **No fee for D.C:** Certifying cause of death – the Registered Medical Practitioner shall, after the death of a person, issue death certificate without charging any fee [Section 10(3)].
- **Fine in negligence for issuing D.C:** Any Registered Medical Practitioner who neglects or refuses to issue a certificate under subsection 3 of section 10 the Registration of Birth and Death Act 1969 shall be punished with fine which may extend to fifty rupees [Section 23(3)].

Part- there are two part of D.C. :

1. **Part I** - deals with the immediate cause and the underlying cause of death where :
 - Only one cause of death is mentioned.
 - Line a: Immediate cause of death is reported,
 - Line b: consequences of line a.
 - Line c: antecedent cause of death is mentioned.
2. **Part II** - deals with other significant conditions or disease contributed to the process of death but did not lead to it.

Importance of D.C

1. Death of a person is certified
2. To know the cause, time, manner and mode of death
3. Whether death is associated with pregnancy or pregnancy causes death
4. Was there delivery? Was it causes death?
5. Other significant conditions contributing to cause of death but not related to the disease or conditions causing it
6. Registration at local bodies – viz. Gram Panchyat/Municipality/Municipal corporation.

Uses of D.C

1. For disposal of body – cremation/burial
2. For statistical purpose – mortality rate, age, sex etc.
3. For pension/insurance purpose
4. For inheritance/succession of property/legal heir
5. For service at place of father etc.

Autopsy

- An autopsy (also known as post-mortem examination or autopsiacadaverum) is a surgical procedure that consists of a thorough examination of a corpse by dissection to determine the cause, mode, and manner of death; or the exam may be performed to evaluate any disease or injury that may be present for research or educational purposes.
- Autopsies are usually performed by a specialized medical doctor. Only a small

portion of deaths require an autopsy to be performed, under certain circumstances. In most cases, a medical examiner or coroner can determine the cause of death.

• Purpose :

- a. To know the Manner of death (Determine if death was natural or unnatural, and Injury source and extent on the corpse)
- b. Post mortem interval
- c. Determining the deceased's identity
- d. Retain relevant organs
- e. If it is an infant, determine live birth and viability

Types : 4

a. Medico-legal or forensic or coroner's autopsies:

- Seek to find the cause and manner of death and to identify the decedent.
- They are generally performed, as prescribed by applicable law, in cases of violent, suspicious or sudden deaths, deaths without medical assistance, or during surgical procedures.

b. Medical or Clinical or pathological autopsy:

- Performed to diagnose a particular disease or for research purposes. For example, material for infectious disease testing can be collected during an autopsy.
- They aim to determine, clarify, or confirm medical diagnoses that remained unknown or unclear before the patient's death.

c. Anatomical or academic autopsy: Performed by students of anatomy for study purposes only.

d. Virtual or medical imaging autopsy:

Performed utilizing imaging technology only, primarily magnetic resonance imaging (MRI) and computed tomography (CT)

Exhumation

- Exhumation is an act of unearthing a buried individual.
- Legally the act is performed when there is a

need for a medicolegal investigation or grave relocation.

Aim

1. It is normally conducted for medicolegal purposes in order to help the judicial system to establish the cause of death or identity of an individual. The process is usually followed by a postmortem inquiry of the exhumed body in order to establish the pathophysiology, pathogenesis and circumstances that led to the death.
2. In Forensic humanitarian matters this process is followed by the collection of postmortem information that is compared with antemortem data to establish the identity of the individual; especially in an event involving mass graves investigation. The process is technically more involving and is an essential tool for detectives.

Collection of evidence in exhumation:

- By collection, excavation techniques involving scraping and screening soil sediments during the exhumation process, flotation procedures for obtaining very small pieces of physical evidences, dead body management, sorting commingled human remains, distinguishing animal and human bone, bioethics, cleaning, and conjoining skeletal remains.
- It could be used in sampling DNA materials and fingerprinting of dead bodies for human identification and collecting essential samples for crime detection such as toxicological evidence.

The Transplantation of human organs and tissues Act (THOTA)

Transplantation of human organs is a biggest achievement in the field of medical science. In medical science, 'transplant' is referred to a part of human body or a complete organ, removed from its original site (donor: an individual) to the different individual.

Organ transplantation in India has a shorter history compared to the most developed countries

in the world. The kidney transplant was first performed in India in the 1970s. Transplantation activities picked up in the 80s and early 90s but it was mainly restricted to live donor kidney transplants in selected urban areas. Slowly, with new clinics coming up and an increase in the availability of trained staff, kidney transplantation activities increased. However, this led to the famous kidney trade in India in the 80s which caught a wide media coverage. Foreigners patients started to flock to India for transplantation from a paid donor. Considering the ongoing kidney scam in India, in 1991, the Central Government constituted a committee to make a report, which would be going to be the basis of legislation governing organ transplantation all over India. Moreover, it was also done to give a better definition of the term 'brain death'.

In 1994, The Transplantation of Human Organs Act (THOA) was promulgated by the government of India. Moreover, the Transplantation of Human Organs Rules followed in 1995 and were last amended in 2014, increasing the scope of donation and including tissues for transplantation. The act made commercialization of organs a punishable offence and legalized the concept of brain death in India allowing deceased donation by obtaining organs from brain stem dead person.

THOTA Act

1. The Transplantation of Human Organs Act, 1994 is meant to provide for the regulation of removal, storage, and transplantation of human organs for therapeutic purposes and for the prevention of commercial dealings in human organs. The Central Act illegalises the buying and selling of human organs and makes cash-for-kidney transactions a criminal offence.
2. The law establishes an institutional structure to authorise and regulate human organ transplants and to register and regulate, through regular checks, hospitals that are permitted to perform transplants.
3. It recognises, for the first time in India, the

- concept of brain-stem death, paving the way for a cadaver-based kidney transplant programme.
4. The Act details actions that amount to direct participation in or abetment of the organ trade; these offences are punishable under Section 19 of the Act.
 5. The Act defines two categories of donors:-
 - a) First, it permits a near relative, defined as a patient's spouse, parents, siblings, and children, to donate a kidney to the patient.
 - b) Secondly, in Section 9(3) of the Act, live donors who are not near relatives but are willing to donate kidneys to the recipients by reason of affection or attachment towards the recipient or for any other special reasons, are permitted to do so, provided that the transplantations have the approval of the Authorisation Committee, established under the Act.
 6. The Act makes the offence of kidney trading non-cognisable. In other words, the police cannot look into complaints of kidney trading independently but must wait for a complaint to be made by the Appropriate Authority set up under the Act or by an officer authorised by it or by an individual who has given prior notice of not less than 60 days to the Appropriate Authority.
 7. It is not clear whether Section 9(3) was deliberately meant - under pressure from special interests - to provide a loophole that could be exploited in practice, or whether the law-makers thought they were sympathetically making provision for donations from second-degree relatives and others who might act out of genuine love and affection or altruism. But whatever be the reasoning and motivation behind the provision of a loophole, the practical operation of Section 9(3), combining with the non-cognisability of the offences to be prosecuted, has rendered the 1994 Act virtually unenforceable.
 8. The Act very sensibly provides for registration of hospitals claiming to have the necessary competence and facilities to perform particular organ transplantation. This is a regulatory measure intended to protect the interests of patients. It is with the Appropriate Authority, set up by the State government under the Act, that hospitals intending to do transplants must register. Approvals are granted only after the institutions fulfill certain technical, infrastructural and medical requirements.

Syllabus

1. Hanging
2. Strangulation and suffocation
3. Drowning

Learning objectives

1. Define hanging. Describe its classification, causes of death, postmortem appearances and medico-legal aspects.
2. Define strangulation and suffocation. Enlist their classification, post-mortem appearances and medico-legal aspects.
3. Define Drowning, explain its classification, post-mortem appearances and medico-legal aspects.

Total - 6 hours (Lecture :04 hour, Non-lecture: 02 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- Yes

Asphyxia

Definition

Asphyxia is defined as interference with respiration or due to lack of O_2 in respired air, due to which the tissue or organ is deprived of O_2 and there is failure to eliminate CO_2 causing unconsciousness or death.

Asphyxial death is diagnosed by triad of the following:-

1. Cyanosis (Bluish discolouration)
2. Congestion : Due to increased venous pressure.
3. Petechial hemorrhages (**tardieu's spots**)-
 - Present above the level of obstruction like scalp, eyebrows, face in hanging or strangulation and above the level of compression in traumatic Asphyxia.
 - They are generally found in those parts where capillaries are least supported, e.g. face, conjunctive, epiglottis, serous surface of heart and lungs, meninges and thymus.

- Tardieu's spots are not pathogenesis of asphyxia, as they are also found in bleeding disorder (scurvy, leukemia); coronary thrombosis; electrocution; poisoning, anticoagulant therapy and blood dyscrasia (thrombocytopenia).
- Tradieu's spots are not found in some form of asphyxia, e.g. drowning.

Causes

Mechanical causes of asphyxia which can cause violent asphyxial death:

1. Hanging
2. Strangulation
3. Suffocation
4. Drowning.

Hanging

Hanging is the form of asphyxia, caused by suspension of the body by a ligature that encircles the neck, the constricting force being weight of the body.

Types of Hanging

A. Based on degree of suspension-

1. Complete hanging

- Body is fully suspended and no part of body touches the ground.
- Constricting force is weight of body.

2. Incomplete (partial) hanging

- There is partial suspension and some body part (usually lower) is touching the ground.
- Constricting force is weight of the head (5-6 kg).

B. Based on the knot of ligature-

1. **Typical hanging** : The ligature runs from the midline above the thyroid cartilage, symmetrically upward on both side of neck to the occipital region, the point of suspension (knot of ligature) being on occiput (at nape of neck).

2. Atypical hanging

- Any variation from typical knot site (i.e. other than occiput/nape of neck) is called atypical hanging.
- Most common site of knot is near one side of mastoid process or angle of mandible.

Causes of death in hanging

1. Cerebral ischemia and anoxia due to compression of carotid artery. It requires 3-5 kg. weight of suspension.
 2. Cerebral congestion due to compression of jugular veins. It requires only 2 kg weight.
 3. Asphyxia due to compression of airways (larynx and trachea). It requires 15 kg weight.
 4. Neurogenic shock
 5. Fracture dislocation of upper cervical vertebrae with damage to spinal cord and brainstem (in judicial hanging).
- * Combined asphyxia and cerebral venous congestion is the most common cause of death.

Important postmortem findings

1. Ligature mark is above thyroid cartilage,

incomplete, bilaterally symmetrical and directed obliquely upward extending to the angles of mandible, then to mastoid and finally to occipital protuberance. Ligature mark is an example of imprinted, pressure, patterned abrasion.

2. Under the ligature mark there is dry, white and glistening pad of fat.
3. There is dribbling of saliva from the angle of the mouth which is confirmatory sign of antemortem hanging. This is due to irritation of submandibular and parotid glands by ligature.
4. There may be intimal tear of carotid arteries.
5. In case of pressure of ligature on cervical sympathetic ganglia. The eye on that side is found open. It confirms antemortem hanging.
6. Fracture of hyoid is usually not seen (may be seen only in 10%). Fracture of thyroid cartilage (20-30% cases) and fracture of tracheal rings (5-10%) may be seen. There may be congestion and ecchymosis (haemorrhage) in trachea, larynx, epiglottis and oesophagus. All these injuries are more common in strangulation because strangulation is more violent than hanging causing more severe injury to neck structures.
7. Tardieu spots (petechial haemorrhage) are not as pronounced as in strangulation.

Ligature mark

- A ligature mark is a well-known pressure mark on the neck underneath a ligature. It is a common injury in hanging and strangulation.
- It is a common injury in hanging and strangulation.
- Ligature mark depends on type of suspension and types of knot.

Types of suspension

In typical complete hanging (full suspension) ligature mark is :

- i) Above thyroid cartilage,

- ii) Oblique,
- iii) Bilateral symmetrical,
- iv) Incomplete.

In partial hanging, ligature mark is below thyroid cartilage and usually transverse.

Types of knot (2)

1. **Fixed noose** : The rope is tied round the neck and the rope is knotted to form fixed knot. This is the most common pattern. In suspension, limbs of the noose near the knot pulled up assuming shape of inverted V, thus ligature mark is in inverted V shape.
2. **Running noose** : One end of the rope is passed through the loop made from the other end. On suspension the knot remains but ligature around neck tightens, therefore ligature mark is horizontal.

Judicial hanging

- In India, legal death sentence is carried out by hanging the criminal. Placement of knot beneath the chin (submental position) is thought to be most effective, ensuring a quicker death.
- The person is allowed to drop for 5-7 meters according to the weight, age and build of the person. Sudden stop causes feature dislocation usually at level of C2-C3 or C3-C4 vertebra, and injury to spinal cord and brainstem (pons and medulla).

Lynching

It is homicidal hanging in which a suspect, accused or enemy is killed by group of people or hanged by a rope from a tree by the mob. Name is derived from William Lynch, a white captain in USA, who used to order hanging of blacks (Negroes) on the spot without trial. Now it is more common news related to smuggling of cow or their meat, rape accused, founding sexual crimes or to take revenge.

Sexual asphyxia (autoerotic hanging)

It is a peculiar type of hanging where the

victims are usually young males with some form of abnormal sexual behavior, usually masochism and transvestism. Partial asphyxia caused cerebral disturbances with feeling of sexual gratification. The impaired consciousness caused by pressure on carotid vessels or partial obstruction of air passages may lead to hallucinations of an erotic nature.

Strangulation

Definition

Strangulation is the form of asphyxia caused by constriction of neck by ligature or some other method, but without suspension of the body. So the force constricting the neck is external force (not the weight of the body as occurs in hanging).

Depending upon the method used to constrict the neck, strangulation can be divided into :

1. **Ligature strangulation** : Neck is compressed by a ligature of which usually multiple rounds are given and no knot is tied.
2. **Throttling** (Manual strangulation) : Neck is compressed by one or both hands. When neck is compressed by two palms, it is known as palmar strangulation.
3. **Bansdola** : Compression of neck with one or two wooden sticks or bamboo.
4. **Garroting** : It is compression of neck by a rope thrown from behind. Spanish windlass is a type of garroting, which used to be the official mode of execution in Spain. In this, an iron cotton around the neck was tightened by a screw for strangulation.
5. **Mugging (choke hold)** : It is compression of neck by forearm or in the bend of elbow.
6. **Strangulation by knee/foot** : In this, neck is compressed by knee or foot.

Important postmortem findings of strangulation

- Ligature mark is present below thyroid and it is horizontal, complete and continuous (in hanging the mark is above thyroid, oblique, symmetrical and incomplete). Area under ligature mark is hemorrhagic with blood outside the vessels due to laceration in vessel wall.
- Since strangulation is more violent than

hanging, the injury to neck structures is more severe in strangulation : Hyoid fracture is more common, as are other neck injuries e.g. fracture of tracheal rings/laryngeal and thyroid cartilage. Manual strangulation (throttling) causes maximum damage.

- There is damage to subcutaneous tissue and muscles of neck.
- Usually no dribbling of saliva from angle of mouth.
- Fracture dislocation of cervical vertebra is rare.
- There is marked congestion of face with multiple petechial hemorrhages.
- Deep cyanosis of face, lips, ears, tongue, nose and nails.
- Eye are bulging out, congested, hemorrhagic

with dilated pupil. Tongue is protruded out, bitten and swollen. There may be bleeding from nose.

- Usually bloody froth at nose and mouth, with frank bleeding from nose, mouth and ears.
- Incontinence of urine, faeces, semen.
- All internal viscera are congested and there are multiple petechial hemorrhages on pleura, pericardium, meninges and internal viscera.

Differences between hanging and strangulation

Since in both hanging and strangulation, there is use of ligature to constrict the neck, therefore hanging and ligature strangulation can be confused with each other. The differences are :

Hanging	Strangulation
General characteristics	
1. There is suspension of body 2. Compression on neck is by a ligature knee or foot. 3. Force of compression is the weight of body (endogenous force)	1. No suspension 2. Compression on neck is by a ligature, hands sticks, elbow 3. It is outside force applied (exogenous force)
Local external Postmortem findings	
4. Ligature mark is above the thyroid is oblique, symmetrical and incomplete injuries on neck depending 5. Knot usually present 6. Usually no mark at site of knot : • In fixed knot, mark is inverted 'V' shaped • In running noose, mark is transverse. 7. Mark usually single. 8. Surface of mark abraded or contused. 9. Surface may show pattern of ligature used. 10. Surface hard 11. Mark-yellowish brown in colour. 12. Margins of mark show petechial hemorrhages. 13. Surrounding skin shows few petechial hemorrhages 14. Depth of mark is less.	4. Mark is on or below the thyroid. It is horizontal, complete and continuous (in absence of ligature mark there are other upon type of strangulation). 5. Usually absent 6. Mark is horizontal, complete and continuous 7. Usually multiple marks. 8. Usually lacerated. 9. Pattern not seen. 10. Soft, due to frank bleeding. 11. Black 12. Frank bleeding present 13. Multiple hemorrhages present. 14. More, like a groove.
Local internal Postmortem findings	
15. Under the mark area is seen as dry, white, glistening pad of fat.	15. Area is hemorrhagic

16. Muscles may be lacerated. 17. Usually no laceration of blood vessels and their walls, (lacerated in judicial hanging). 18. May be fracture of trachea, thyroid and larynx. 19. Cervical vertebrae fractured usually at C ₂ -C ₃ and rarely C ₃ -C ₄ or C ₁ -C ₂ , in judicial hanging. 20. Fracture of hyoid bone is uncommon. 21. Injury to spinal cord, pons and medulla common in judicial hanging 22. Fracture of thyroid less common	16. Lacerated 17. Lacerated 18. Usually fractured. 19. Fracture cervical vertebrae uncommon 20. Fracture of hyoid bone, of adduction type (inward compression fracture), very common in throttling. 21. No injury to spinal cord, pons and medulla 22. More common fracture thyroid
Sings of struggle and violence	
23. Signs of struggle and violence absent 24. No questions of sexual on female victim, as this is usually suicidal and it is uncommon in females. 25. Since hanging is usually suicidal no question of hiding the cause of death.	23. Due to struggle, abrasions and contusions present on the body 24. May be sexual assault on female victim 25. Since strangulation is usually homicidal there is attempt at hiding the crime. Dead body may be hanged; thrown in water, jungle, or acid; may be burnt.
General external P.M. Findings	
26. Features of asphyxia mild. 27. Head tilted to side, opposite to knot. 28. Neck stretched. 29. Face usually pale. 30. Mild cyanosis on nose, lips, ears and nails 31. Few petechial hemorrhages in eyes and on face. 32. Tongue usually inside 33. Bloody froth at nose and mouth is sometimes present. 34. Usually there is dribbling of saliva from angle of mouth	26. Greatly marked 27. No such tilting. 28. No stretching. 29. Deeply congested and deeply cyanosed 30. Severe cyanosis 31. Multiple petechial hemorrhages eye protruded out. 32. Tongue-protruded, bitten and black 33. Usually present 34. Usually absent

Suffocation

Definition

Suffocation is a form of asphyxia caused by mechanical obstruction to the passage of air into the respiratory tract by means other than constriction of neck or drowning.

It includes smothering, gagging, choking, burking, traumatic asphyxia and cafe coronary.

Smothering

- Asphyxia is caused by mechanical occlusion of external air passage, i.e. entry of air to lungs is prevented by closure of nose and mouth. Lips, gums, tongue, inner side of nose may show bruising or lacerations.
- Asphyxial signs (congestion, cyanosis, petechiae) are severe except when the head and face is enclosed in plastic bag.

Chocking

Asphyxia caused by mechanical occlusion of internal air passage, i.e., obstruction of respiratory passage (glottis, larynx, trachea, bronchi etc.).

Gagging

It is chocking by preventing air entry through mouth and nostril by filling piece of cloth in the mouth.

Traumatic asphyxia

It is a form of asphyxia which is caused from respiratory arrest due to mechanical fixation of chest resulting from blunt trauma to chest or external pressure on the chest, abdomen or back which prevents normal respiratory movements of the chest wall.

It may be due to :

- a) Stampede in crowd (riot crush or human pile death).
- b) Crush by heavy object e.g. road traffic accident, railway accident, overturn of tractor in farm and fall of earth, stone etc. in mine or in a building collapse.

Burking

- It is combination of smothering and traumatic asphyxia.
- This method was used by Burk and Hare. Burk used to sit on chest covering with one hand the mouth and nostril and pushing up the jaw with other hand and Hare used to pull him around the room by feet.

Cafe coronary

- It is accidental chocking by bolus of food obstructing larynx. Death is mostly due to asphyxia, or due to reflex cardiac arrest caused by stimulation of laryngeal nerve endings.
- It is common when gag reflex is suppressed, e.g. intoxicated individuals and following large dose of tranquilizers.

Overlying (compression suffocation)

It is a type of asphyxia which results due to compression of chest, so as to prevent breathing.

Drowning (Immersion or Sumersion)

- **Definition :** It is form of asphyxial death in which entry of air into lungs is prevented by presence of water or other fluid in lungs and respiratory passages. Water having entered through nose and mouth.
- For death due to drowning, there is need of submersion of nose and mouth in water and it is not essential, that the whole body should be submerged in water.

Types of drowning (2)

1. Typical drowning
2. Atypical drowning

1. Typical drowning (wet drowning)

- It is obstruction of air passages and lungs by inhalation of water or other fluid. So, it is called wet drowning.
- Findings of fluid and froth are present in postmortem examination.
- Types :
 - a. Fresh water drowning
 - b. Salt water drowning

Fresh water drowning

In fresh water drowning, large quantities of water cross the alveolar membranes into circulation



Hypervolemia and hemodilution



RBCs imbibe water and burst (hemolysis) with liberation of potassium



heart is exposed to volume overload, potassium excess,

sodium deficit (hyponatremia) and anoxia



Anoxia and hyperkalemia cause ventricular fibrillation

and death in 4-5 minutes.

Salt water drowning

Hypertonicity of inhaled water



Loss of fluid from circulation into the lungs



- Fulminating pulmonary oedema with progressive hypovolemia
- Circulatory shock, and
- Eventually cardiac standstill (asystole) with death in 8-12 minutes.

2. Atypical drowning

Little or no water enters in respiratory passages and lungs after submersion of body in water. Froth and oedema aquosum of lungs are not found.

Atypical drowning may be :

a) Dry drowning

- On contact with water, especially cold water, there results intense laryngospasm that water does not enter the lungs.
- Death is due to asphyxia because of laryngospasm.

b) Immersion syndrome (hydrocution/submersion inhibition/vagal inhibition)

- Sudden death occurs due to vagal inhibition as a result of:
- Sudden impact with cold water
- Duck diving (falling in water with feet first), and Horizontal entry in water with impact on epigastrium.

c) Submersion of unconscious

- If person is unconscious since before submersion in water, little or not water enters respiratory passages.
- It may occur in myocardial infraction, cerebrovascular accident, hypertension, epilepsy, cerebral aneurysm and in drunk state.

d) Near drowning (secondary drowning syndrome/post immersion syndrome)

- In this drowning survival and death occurs at a later stage after removal from water. Either the person himself comes out of water or the recovered alive, but due to complications of submersion, he dies at a later stage.
- It is due to hypoxic encephalopathy and

fibrosing alveolitis. The death occurs due to combined effect of cerebral hypoxia, pulmonary edema, aspiration pneumonitis, electrolyte disturbance and metabolic acidosis.

Important postmortem findings of drowning

A. External findings

- The eyes are half opened with dilated pupil, congested conjunctiva and almost nil petechial hemorrhage.
- Cutis anserina (goose skin), i.e. granular appearance of skin with erect hair due to contraction of erector pili.
- Washer woman hand and feed, i.e. bleached and corrugated appearance of palm and soles.
- Important specific signs-
 - i) White, fine, leathery, abundant and tenacious (sticky) froth of nose and mouth. Froth increases in amount on compression of the chest. Froth in the nose and mouth is also seen in certain poisoning, e.g. cocaine, organophosphorus, morphine (opioids) and barbiturates. But the froth is neither so fine nor so copious and persistent in these poisonings.
 - ii) Weeds, grass plants, mud or stones in tightly clenched hand. It is due to cadaveric spasm and strongly suggests that the person was alive when drowned, as it indicates the struggle of person for life. Abraded tips of fingers and toes, and sand under damaged nails have same significance.
 - iii) Postmortem lividity is light pink or dusky and cyanotic, and is most marked in head, neck and chest.

B. Internal findings

- The presence of white, fine, lathery and tenacious froth in air passages.
- Subpleural hemorrhage on the surface of lung, called plateful's hemorrhage are petechial hemorrhage.

- Emphysema aquosum, i.e. water logged, heavy voluminous lungs. It is found only in wet drowning (not in dry drowning).

Specific sings

- i) Water in stomach and intestine is a diagnostic manifestation that the person was alive when drowned, because in postmortem drowning, water may be found in oesophagus but not beyond cardiac sphincter. After putrefaction, since there occurs relaxation of cardiac and pyloric sphincters, presence of water in stomach and intestine has no significance.
- ii) Diatoms in brain and bone marrow are also diagnostic and even more significant than presence of water in stomach and intestine, especially in decomposed (putrefied) body as diatoms resist putrefaction.

Diatoms test is negative in dead bodies thrown in water and in dry drowning.

Gettler test

- Gettler test is done for drowning.
- Gettler's test estimate chloride content of blood from both sides of heart. Normally the chloride content is equal in the right and left chamber of the heart (600 mg/100 ml).
- In fresh water drowning due to hemodilution the chloride content is decreased and in salt water drowning due to hemo-concentration the chloride content is increased in left side of heart. A 25% difference in chloride is significant but the test is of doubtful value.

1 Limitations of gettler test :

1. No value in atypical drowning congenital cardiac defects as shunts and patent foramen ovale; and if drowning medium contains same amount of chloride.
2. There is progressive loss of chloride ion from blood after death. Therefore the test has to be made within a reasonably short time after death.

Suicidal / homicidal / accidental drowning

Most of the cases of drowning are accidental but appx. 1/3 is being suicidal and homicidal drowning.

Suicidal drowning

- It is indicated by absence of signs of struggle or assault (e.g. torn clothes, injury marks).
- A determined suicide may tie his hand and legs together or attach weights to his body or take poison or cut throat before immersion.

Homicidal drowning

- There are signs of struggle and violence (assault) (e.g. head injury, sings of strangulation, or throttling).
- Head and feet may be tied, heavy weight may be attached to body or body may be tied up inside a gunny bag.
- Homicidal drowning is very rare except in infants and children.

Accidental drowning

It is quite common and usually seen in children, non-swimmers during floods or due to fall in well etc.

Syllabus

1. Basics of injury
2. Mechanical injury
3. Firearm injury
4. Thermal injury

Learning objectives

1. Define and classify Injuries. Describe the medico-legal aspects of injuries.
2. Describe the characteristics, age and medico-legal aspects of mechanical injuries.
3. Describe firearm injuries, its characteristics and medico-legal aspects. Differentiate between entry and exit wound
4. Define and classify thermal injury. Describe characteristics and degrees of burns, rule of nine, post-mortem appearances, and medico-legal aspects.
5. Explain medico-legal aspects of dowry death.

Total - 8 hours (Lecture :05 hour, Non-lecture: 03 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- Yes

Definition of Injury

- An injury is any damage to any part of the body due to application of mechanical force.
- Legal definition: Any lesion, external or

internal caused by violence, with or without breach of continuity of skin.

- Section 44 of IPC defines injury as “any harm caused illegally to a person in body, mind, reputation or property”.

Classification

I) According to Causative Forces	A) Mechanical injuries	1. Blunt force injuries • Abrasion • Contusion • Laceration • Fracture and dislocations of teeth/bone 2. Sharp-edged injuries • Incised wounds • Chop wounds 3. Piercing injuries-stab wounds 4. Firearm injuries-firearm wounds.
	B) Thermal injuries	1. Due to cold : • Frost bite • Trench foot • Immersion foot

	C) Chemical injuries	2. Due to heat : • Burns • Scalds 1. Corrosion – corrosive acid/alkali/metal salts 2. Irritation – weak acids or alkali
	D) Miscellaneous injuries	1. Electricity 2. Lightning 3. X-rays 4. Radioactive substances.
II) Medicolegal Classification	1. Suicidal injury or self-inflicted injury 2. Homicidal injury 3. Accidental injury 4. Defence wounds 5. Fabricated wounds.	
III) Injuries in Relation to Death	1. Antemortem injury 2. Postmortem injury	
IV) Legal Classification	1. Simple injury 2. Grievous injury.	

Abrasion

An abrasion is a type of mechanical injury characterized by loss of superficial layer of skin (i.e. epidermis) or mucous membrane due to application of mechanical force (by skin rubbing against a rough surface).



Types

1. Linear abrasion

- Scratch abrasion
- Sharp, narrow object such as pin, thorn, barb, prickle, pointed end of weapon etc

2. Graze abrasion :



- Sliding abrasion, gliding abrasion, brush abrasion, scrape abrasion
- Wider at the starting point and they get narrower at the end
- Uneven, longitudinal, parallel lines

3. Pressure abrasion :



- Crushing of superficial layer of skin

4. Imprint abrasion :



5. Motor-tyre mark or radiator grill mark over skin in vehicular accident cases

Medicolegal Importance

1. Site of impact and direction of force used to inflict abrasion can be known
2. Type of weapon/object used can be identified
3. Time of assault can be determined from the age of abrasion
4. Abrasions are usually simple injuries. However, abrasion over cornea may produce corneal opacity and restrict vision of a person. Such hurt becomes grievous one.
5. Can give idea about some type of offenses committed.
For example abrasion near private parts of female may be suggestive of sexual offense attempted or committed. Similarly abrasion at neck may be indicative of throttling. Abrasion around mouth and nose may be suggestive of smothering.
6. Abrasion may be only injuries present over surface of deep seated or internal injury.
7. Presence of foreign material along with abrasions, such as sand particles, mud, dirt, grease etc. may connect the injuries with scene of crime.

Contusion

A contusion is an extravasation or collection of blood due to rupture of blood vessels caused by application of mechanical force of blunt nature without loss of continuity of tissue.



Types

- Intradermal bruise
- Subcutaneous bruise
- Patterned contusion
- Deep bruise
- Tram-line contusion
- Six-penny bruises
- Horse-shoe-shaped contusion
- Contusion over organs
- Gravitating or shifting contusion
- Spectacle hematoma.

Bruises (Ecchymosis)

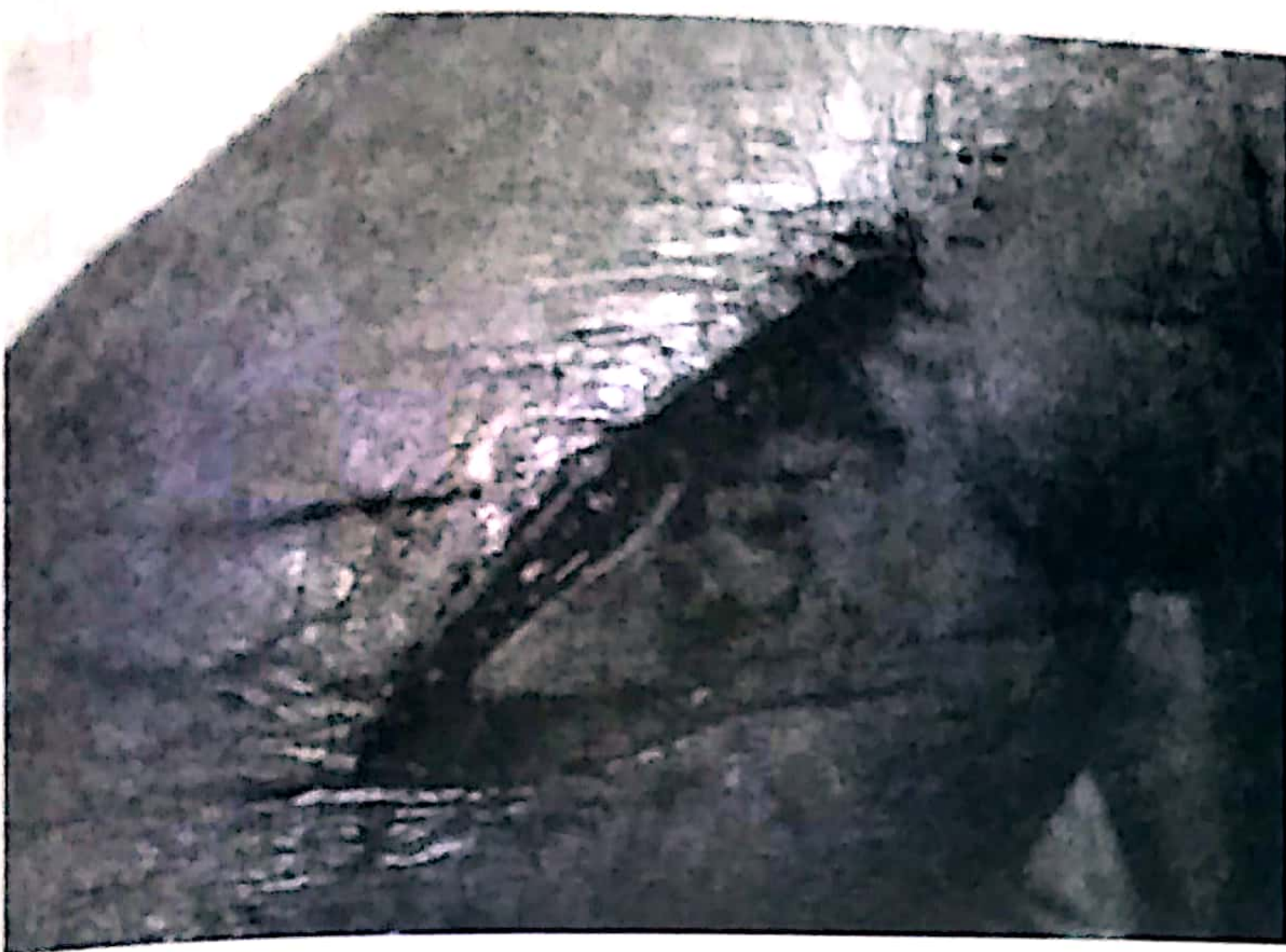


- It is leakage of blood into underlying tissues from damaged blood vessels.
- Two events must occur before a bruise formation: damage to the small blood vessel, and the leakage of the blood into surrounding tissues (skin or deep tissue).
- A yellow-coloured bruise may be more than 18 hours old. The colouring must not be taken from photographic images where colour reproduction may be inaccurate.

Medicolegal Importance

1. Offending weapon can be known.
2. The age of injury can be determined.
3. Character and manner of injury can be known.
4. Application of degree of violence can be estimated.

Laceration



Laceration wound is form of mechanical injury caused by hard and blunt force impact characterized by splitting or tearing of tissues.

Lacerations appear as 'cuts, splits or tears' in the skin and are the result of a blunt force compressing or stretching the skin; they may extend through the full thickness of the skin and can bleed profusely, the same blunt force causing such a laceration may also cause irregular splits, bruising and abrasion at the margins of the wound.

Lacerations are most common where the skin can be compressed between the applied force and underlying bone (i.e. over the scalp, face, elbows, knees, shins, etc.).

The shape of the laceration (e.g. linear, curvilinear or stellate) rarely reflects the nature of the impacting object (unless accompanied by other patterned blunt-force injury).

Types

1. Split laceration - incised looking laceration, caused by blunt force, Common sites includes—scalp, face, shin etc
2. Stretch laceration - over-stretching of the fixed skin till it ruptures

3. Tear laceration - tearing of the skin and subcutaneous tissue
4. Avulsion laceration - due to grinding compression of the tissues to such an extent that the skin gets detached from the deeper tissues
5. Crush laceration - total or partial amputation of the affected body part
6. Cut laceration – produced by a heavy sharp edged instruments.

Medicolegal Importance

1. Cause of injury can be known
2. Type of lacerated wound may be known
3. Nature of injury can be ascertained – whether simple or grievous
4. Foreign bodies present in wound may help in identification of the offending weapon/place of incident etc.
5. Age of injury can be estimated
6. It can be known whether the injury is accidental or suicidal or homicidal
7. Direction of application of force can be known.
8. It may be confused with incised wound.

Incised wound



An incised wound is form of mechanical injury characterized by orderly solution of skin and tissues.

Features

- Always broader than the edge of the weapon,

- Length of incised wound is greater than the breadth or depth of wound,
- Starting end of incised wound is deeper than end part,
- Haemorrhage is more

Medicolegal Importance

1. Cause of injury can be known
2. Nature of injury can be ascertained – whether simple or grievous
3. Age of injury can be estimated
4. It can be known whether the injury is accidental or suicidal or homicidal
5. Direction of application of force can be known.
6. It may be confused with lacerated wound.
7. Self-inflicted injuries – vide supra
8. Defence injury – vide supra
9. Fabricated wounds

Chop wounds

Chop wounds are type of incised wounds made by hacking or chopping motion with a fairly sharp and relatively heavy weapon.

Features

- Produced by relatively heavy sharp cutting weapons such as axe, chopper, sword.
- Wound is comparatively wider and deeper than incised wound.

Medicolegal Importance

1. Chop wounds are usually homicidal in nature.
2. From the heel or toe end, the relative position of the assailant and the victim can be known.
3. The type of weapon used can be known.
4. Age of injury can be known.

Stab wound

Stab wound is a piercing wound produced by application of mechanical force along the long axis of a narrow or pointed object.

Types

1. Puncture wounds: depth is greatest dimension and caused by a sharp pointed object.

2. Penetrating wounds: when a sharp objects penetrates in to body, eg. In thorax and abdomen.
3. Perforating wounds: when a sharp tip of weapons perforates so as to cause wounds.
4. Concealed punctured wound.

Medicolegal Importance

1. Stab wounds may be suicidal, homicidal or accidental.
2. Type and dimension of weapon used can be known.
3. Movement of knife in the wound can be known.
4. Depth and direction of thrust can be known.
5. Amount of force used can be known.
6. Age of wounds can be known.
7. Manner of infliction – suicidal/homicidal/accidental can be known.

Other types of injury pattern

1. Punching

- A punch is a blow delivered by the clenched fist.
- Visible injury is more likely to be seen over those areas of the body where the skin is closely applied to bone, as in the face and skull.
- The entire range of blunt force injuries can be caused, including bruises, abrasions, lacerations and fractures. Any examination following a blow to the face or mouth requires intraoral examination.

2. Kicking and stamping

Blows from the foot are commonly directed towards the head and face, the chest and the abdomen. Stamping injuries to the front of the abdomen may result in rupture of any of the internal organs.

3. Bite injuries

- Bite marks can be seen in sexual assaults, child abuse and occasionally on the sports field.
- A forensic odontologist should review any

possible bite marks when confirmation of identity of the biter is required. The neck, breasts and shoulders are often bitten in a sexually motivated attack, while in child abuse bites to the arms and the buttocks are common.

- If a suspected bite is found at examination, a swab of the area should be taken for DNA and the bite should be photographed with a scale.

4. Defence injuries

When a knife or a stabbing implement is directed at an individual, blows to the head and face may be defended by raising the hands and arms to cover the head and face (The arms and hands sustain injuries but the head is protected).

5. Self-inflicted injury

Fatal self-inflicted blunt-force injuries may be inflicted following jumping from a height or under a train. Self-inflicted bite marks may occasionally be seen on the arms of an individual who claims to have been assaulted or blunt force injuries to the head or other parts of the body.

Self-inflicted incised or stabbing injuries show specific patterns that vary depending on the aim of the individual. In suicidal individuals, self-inflicted sharp-force injuries are most commonly found at specific sites on the body called '**elective sites**'; for incised wounds these are most commonly on the front of the wrists and neck, whereas stabbing injuries are most commonly found over the precordium and the abdomen.

The other features of self-inflicted injuries lie in the multiple, predominantly parallel, nature of the wounds and, in suicidal acts, the more superficial injuries are referred to as '**hesitation**' or '**tentative**' injuries.

Specific torture techniques that may be described include:

- Beating of the soles of the feet
- Amputation
- Positional torture
- Suspension

- Electrical burns

Torture

The physical examination must involve systemic examination of the skin, face, chest and abdomen, musculoskeletal system, genitourinary system and the central and peripheral nervous systems. Specific examination is required. Specialized diagnostic tests may be required to assess damage.

The history taking should include direct quotes from the victim, establishment of a chronology backing it up with old medical records and photos. A summary of detention settings, and abuses, must be obtained with details. Attention must also be paid to psychological status of the victim.

Firearm injuries

Firearm is any instrument or device designed to propel a projectile by means of explosion of gases generated by combustion of an explosive substance.

Ammunition means the material used to cause the explosion i.e. the ingredients used such as bullet, pellet, powder etc.

Ballistics is a science that deals with the investigation of firearms, ammunition and the effects arising from their use.

Classification of Firearms

A) According to condition of barrel

1. Smooth bore firearm (shotgun)
2. Rifled firearm
3. Country made firearm
4. Air gun
5. Paradox gun

B) According to muzzle velocity

1. Low velocity (up to 1200 ft/s) for example revolver, pistol
2. Medium velocity (between 1200 – 2500 ft/s)
3. High velocity (> 3000 ft/s) for example machine gun

Structure of Firearm

1. Barrel - hollow steel tube or cylinder and the

length varies according to type of gun. The lumen of tube or cylinder is known as bore.

2. Grip or butt or stock.
3. Action - It consists of: Trigger, Trigger guard, Bolt, Striker or Hammer.

Cartridge of Shotgun (Smooth Bore Firearm)

Cartridge is ammunition for firearms that is loaded into the chamber of firearm.

Detonator

- Also called as primer
- The purpose of primer is to ignite the gun powder.

Propellant

- Also called as gunpowder
- It is placed next to the primer (detonator) in cartridge
- The ignited primer causes combustion of gunpowder
- The combustion of gunpowder produces hot gases under tremendous pressure and causes propelling out of pellets (or bullet) from firearm with velocity.
- There are three types of gunpowder available as mentioned below :
 1. Black powder
 2. Semi-smokeless powder
 3. Smokeless powder.

Projectile

- Smooth bore weapon have projectile in form of pellets (shot). Pellets comprises of multiple spherical balls of lead
- Shots or pellets are of two types:
 1. Soft or drop shot – made up of soft lead
 2. Hard or chilled shots – made from lead and

hardened by antimony.

Bullet

- Usually bullet is conical in shape and has following parts
 1. Base – is flat and held in cartridge case
 2. Body
 3. Nose – tip of bullet is called as nose
- Caliber of a bullet is its cross-sectional diameter
- Size - short, medium or long.
- Shape - conical or oval
- Depending on pattern of nose, bullet is divided into following
 1. Round nose
 2. Square nose
 3. Pencil point nose
 4. Flat point
 5. Long round nose

Working of Firearm

Three steps: Loading, cocking, and firing.

Firearm wounds or Wounds Ballistics

Doctors doing autopsy of firearm cases are concerned with wound ballistics.

The following issues need attention while conducting autopsy :

1. Whether the weapon is rifled or smooth bored?
2. The nature of projectile
3. The nature of propellant
4. The direction of firing
5. The range of firing

Rifled firearm produces two wounds; one, the wound of entry (entry wound) and other the wound of exit (exit wound).

Difference between Entry and Exit wound

Entry wound	Exit wound
1. The wound is smaller in size.	1. Outwardly split edges.
2. In flat bone (skull), wound is cut on the outer surface and chipped inward.	2. Bevelled and everted.
3. Edges are inverted.	3. Edges are everted.

4. Abrasion collar is present.	4. Absent.
5. Burning, blackening, singeing and tattooing may be seen at appropriate distance.	5. Can't seen.
6. Clothing may be turned in and carried into the wound.	6. May or may not be turned out.
7. Track near the entry wound may be bright pink	7. Usually not so.
8. Lead ring may be seen on radiological examination	8. Lead ring absent.

Test used in firearm discharge

1. Based on detection of nitrate: dermal nitrate or paraffin test,
2. Based on detection of heavy metal:
 - Harrison and Gilroy test – detects Antimony, Barium and Lead
 - Neutron activation analysis – detects Antimony and Copper.
 - Atomic absorption spectroscopy – detects Antimony, Barium and Copper.

Explosion injury

An explosion is a phenomenon resulting from sudden release of energy which is then dissipated by a blast wave, by translocation of objects or by generation of heat.

Types:

1. Primary: due to shock waves, occurs in hollow organs, eg. Ears, lungs, eyes, GIT etc.
2. Secondary: due to flying debris (missiles).
3. Tertiary: due to blast wind i.e victim is thrown out into air and strikes other objects leading to fracture blunt trauma.
4. Quaternary: any complicating factor eg. Anoxia, respiratory problems.

Motor vehicle injuries

It may be:

1. Motor cycle (two-wheelers) injuries –

- a. Motorcyclist fractures – it is hinge fracture of base of skull, dividing into anterior and posterior half.
- b. Ring fractures (foramen magnum fractures) – anterior 1/3rd is separated from posterior 2/3rd at its junction.

- c. Bicycle spoke injury – when rider slip from seat and his leg or foot passes through space of wheel.
- d. Under running (tail gating) - motor cyclist may drive into back of large vehicle and due to its sudden an unexpected stoppage.

2. Car (four-wheelers) injuries –

- a. Sparrow foot marks – multiple punctuate laceration on face due to shattering of windscreen glass into multiple small blunt edges fragments.
- b. Hinges fracture
- c. Ladder tears
- d. Seat belt syndrome – there is contusion, laceration, perforation and avulsion of small intestine, omenta and mesenteries.
- e. Whiplash injury – Acute hyperflexion followed by hyperextension of neck due to violent acceleration or deceleration force applied to front seat passenger.
- f. Steering wheel impact type injury – due to sudden stoppage of car, throwing forward the driver and throat may be crushed.

Pedestrian Injuries

A pedestrian may sustain following types of injuries. This mechanism of pedestrian injury is called as Waddle's Triad.

1. Primary impact injuries -

- Caused by vehicle when it first struck or hit the person,
- Body of victim may bear design/pattern of the part of vehicle in form of imprint abrasion or patterned bruise,

- Most common sites: leg (85%), followed by head > arms > pelvis > chest or abdomen > neck and spine.

2. Secondary impact injuries –

- Due to subsequent impact with same vehicle.
- Usually in same side where primary impact injury occurs.
- Causes severe head injury, laceration, and run over by passing vehicle.

3. Secondary injuries –

- Caused by a person violently falling on ground or an stationary object
- Found on parts opposite to primary impact or on head.

Regional injuries

Specific regions of the body may be particularly susceptible to types of trauma that may not cause serious or fatal injury elsewhere. A good example of this may be the single stab wound. If this penetrates the limbs then a serious or fatal outcome is unlikely, unless a large artery is injured. If a single stab wound penetrates the heart or the abdominal aorta a fatal outcome is much more likely. Consideration of patterns of injuries according to the body region, and the potential complications of those injuries, is therefore an important component in both the clinical and pathological evaluation of trauma.

(a) Head Injuries

- Any trauma to the head or face that has the potential for damaging the brain can have devastating consequences. Normally the brain is protected within the bony skull, but it is not well restrained within this compartment and injuries to the brain result from differences between the motion of the solid skull and the relatively 'fluid' brain. There are three main components of the head: the scalp, the skull and the brain.
- The clinical significance of a space-occupying lesion (e.g. intracranial haemorrhage) within the cranial cavity is the effect that the raised

intracranial pressure caused has on brain structure and function.

(b) Scalp Injuries

- Bruises of the scalp are associated with prominent oedema.
- The easiest way to detect scalp injuries is by finger palpation, but shaving is often required.
- Lacerations of the scalp can usually be distinguished from incised wounds, its relative 'thinness' and tethering to the skull, contributes to the appearance of an incised wound following blunt impact.
- Scalp abrasions, bruises or lacerations represent contact injuries, and their presence will assist in the identification of the point of contact/impact. Bruises, however, may evolve, and 'move' in tissue planes.

(c) Skull fractures

- The complexity of the skull structure means that mechanisms of skull fracture can be extremely complex as a result of both direct force (e.g. direct impact to the parietal bone causing a linear fracture) and indirect force (e.g. an orbital blowout fracture caused by impact to the eyeball).
- The site of fracture therefore represents that point at which the delivered energy has exceeded the capability of the skull to distort, which is not necessarily at the site of impact, the skull's capability to distort before fracturing varies with age, and an infant skull may permit significant distortion following impact without fracturing.
- Fatal brain injury can occur in the absence of externally visible, scalp injury, or skull fracture and, conversely, scalp injury overlying skull fracture may be associated with minimal (or no recognizable) brain, Injury or neurological deficit.
- A direct blow to the nose can cause blunt force injuries to the nose itself, but may also cause bilateral periorbital bruising.

- Blows to the top of the head commonly result in long, linear fractures that pass down the parietal bones.
- If the vault fractures extend through the skull base from both sides, they may meet in the middle, the pituitary fossa, and produce a complete fracture across the skull base: this is known as a hinge fracture.

(d) Intracranial haemorrhage

- The anatomy of the blood vessels within the skull has a major influence on the type of bleeding.
- The meningeal arteries are generally protected from the shearing effect of sudden movement but are damaged by fracture lines that cross their course.
- The connecting veins are at particular risk of 'shearing' injury when there is differential movement between the brain and the skull.
- The cerebral arteries and veins, lies beneath the arachnoid membrane and is generally protected from all but penetrating injuries.
- Extradural haemorrhage is associated with damage to the meningeal artery, particularly the middle meningeal artery.
- Extradural hemorrhages are ones that in the clinical setting may present with head trauma and then a 'lucid period' of half an hour or more, before rapid deterioration. Rarely, extradural haemorrhage can develop as a result of venous bleeding.
- Subdural haemorrhage is associated with damage to the communicating veins. This venous damage is not necessarily associated with fractures of the skull.
- Recent subdural haemorrhages are dark red in color and shiny. Microscopically, hemosiderin can be identified with Perl's stain
- Chronic subdural haematomas are seen in those prone to frequent falls, and elderly, whose cerebral atrophy allows space for the formation of the haematoma without apparent significant clinical effect.

(e) Traumatic subarachnoid haemorrhage

- Small areas of subarachnoid haemorrhage are common where there has been direct trauma to the brain, either from an intrusive injury, or from movement of the brain against the inner surface of the skull.
- Large basal subarachnoid haemorrhages can be of traumatic origin and follow blows or kicks to the neck.
- Most basal subarachnoid haemorrhages are, however, non-traumatic in origin and arise from the spontaneous rupture of a berry aneurysm of one of the arteries in the circle of Willis.

(f) Brain injury

- Injuries that have resulted in skull fractures or intracranial haemorrhage are clear macroscopic markers of significant force having been applied to the head and therefore to the brain.
- Whatever the precise cause of the trauma, the effects on the brain, as a whole, are the same and, as a consequence of the body's response to primary traumatic brain injury, cerebral oedema develops (i.e. secondary brain injury).
- Direct injuries to the brain from depressed or comminuted skull fractures result in areas of bruising and laceration of the cortex.
- Penetrating injuries from gunshots or from stab wounds can cause injuries deep within the white matter, and the tissue adjacent to the wound tracks will often be contused and lacerated.

(g) Neck injuries

Its relevance in forensic medicine results from :

1. The presence of a large number of vital structures.
2. It is particularly prone to injury.

The forensic post-mortem examination of the neck is done by: a layered, dissection of the anterior (and often posterior) neck structures.

In a penetrating trauma (sharp force or ballistic) to the neck particular forensic significance in incised wounds to the neck is the pattern of injury.

1. Arterial injury: suspicious death
2. Venous injury: possibility caused by cardiac air embolism.

(h) Spinal injuries

- The spine is very commonly injured in:
 1. Major trauma
 2. More subtle injury, e.g.: disruption of the atlanto-occipital joint which can cause damage to the upper cervical spine.
 3. Spinal damage will depend upon:
 - a. Anatomical site
 - b. Mechanism of injury.
 - c. The type of injury: depends upon degree of force and the angle at which the spine is struck.
- Structures in the spinal cord that can be affected: the discs, the vertebral bodies, the neural arches and the transverse processes.
- Whiplash injuries in road traffic fatalities are associated with hyperextension of the neck.
- Hyperflexion injuries can be caused if heavy weights are dropped onto the back of a crouching individual. Forceful extension of the spine: are rare, causes cervical injuries and associated with judicial hanging.

In this kind of injuries there is:

1. Long drop before the sudden arrest
2. Forceful extension of the neck.
- Forceful flexion of the spine will commonly lead to the 'wedge' fracture or compression of the anterior aspect of a vertebral body.

(i) Chest injuries

- Results in fractures of the ribs:
 1. Few: unlikely to cause effects
 2. Numerous: functional integrity of the chest wall may be compromised.
 3. Trauma that has fractured left sided 10th, 11th and 12th ribs may be substantial enough to cause injury to the underlying spleen.
- Rib fractures may have other more serious consequences based on the direction of the sharp end:
 1. Inward: pneumothorax, haemopneumothorax,

2. Outward: Pneumothoraces.

(j) Injuries of Abdomen

Blunt force injuries - especially in the anterior/posterior direction can cause compression of the organs lying in the midline against the vertebral column, which in order causes injury to intra-abdominal organs, including:

1. Bruising (or transection) of the duodenum or jejunum.
2. Rupture of the pancreas.
3. Rupture of the liver.
4. Disruption of omentum and mesentery.
 - The forces required to cause these injuries is severe and they are commonly encountered in road traffic collisions.
 - Kicks and stamps are commonly the cause of major trauma.
 - The kidneys and the spleen are susceptible to direct trauma. Rotational forces causes avulsion from their vascular pedicles.
 - Spleen is sometimes associated with delayed rupture leading to haemorrhage and possibly death some hours or even days after the injury.
 - Pancreatic trauma may lead to the development of a pseudocyst, with little or no short-term or long-term sequelae.
- In children: Abdominal injuries may have the same causes, but the force required to cause injury is reduced. Also slower compressive forces associated with squeezing of the abdomen during abuse may also result in those kind injuries.
- Intra-abdominal injuries could be caused by cardiopulmonary resuscitation (CPR) but rarely.

(k) Penetrating injuries

- Depend almost entirely on the organs and vessels involved.
- A penetrating injury to the aorta, or inferior vena cava, can result in severe haemorrhage and may produce rapid death.
- Peritonitis from a ruptured bowel or stomach may not be recognized until too late.

- Post-mortem: peritonitis and blood clots are both factors which may give indications of how long before death intra-abdominal trauma had occurred.

Thermal Injuries

Thermal injuries are defined as the injuries caused by some form of heat or by a chemical substance. These are classified into : (i) burns, (ii) scalds (caused by moist heat) (iii) chemical burns, (iv) radiation burns, (v) electric burns, (vi) lightning burns and (vii) explosive burns.

1. Burns (Simple Burns)

Simple burns are caused by application of dry heat. The minimum temperature for producing a burn is about 44°C for and exposure of about 5-6 hours. At 65°C , two seconds are sufficient to produce burns, and full thickness destruction of skin occurs within seconds above 70°C .

Degree of burns

- Dupuytren's classified burns into six degrees, which can be merged into three degree by Wilson :

i) Epidermal (first and second degree dupuytren) : The affected part is erythematous (red), there is capillary dilatation and transudation of fluid into the tissue causing swelling. Repair is complete without scar formation. These are painful burns.

ii) Dermo epidermal (third and fourth degrees dupuytren) : Whole thickness of skin is destroyed with destruction of dermal appendages. These burns appear as shriveled, depressed areas of coagulated tissue, bordered

by reddish blistered skin. Pain and shock are greater than in first-degree burns.

- iii) Deep (fifth and sixth degrees) :** In this, there is a gross destruction of the skin and subcutaneous tissue, muscle and bone. Nerve endings are also destroyed (painless burns).
- The burn index (devised by brook army medical center burn unit of US army) combines depth and area to gain insight into prognosis and effectiveness of treatment. In this $1/2$ point is given to each percentage of 2nd degree burn and 1 point to each % of 3rd degree burn. Mortality is about 50% at 45 points.

Extent of burns

The surface area burnt is more important than the degree of burn, in assessing prognosis of a given case. For example, a first degree burn over a wide area is more dangerous than a third degree burn over a limited area. For estimation of burn area, there is rule of 9 (Wallace's formula) :

- a) In adults surface area is calculated by :

1. 9 % for the head and neck.
2. 9 % for the upper limb.
3. 9 % for the front of each lower limb.
4. 9 % for the back of each lower limb.
5. 9 % for the front of the chest.
6. 9 % for the back of the chest.
7. 9 % for the front of the abdomen.
8. 9 % for the back of the abdomen
9. 1 % for the genitalia.

- b) In children the calculation is slightly different which can be tabulated as follows:

Area of body	In Children (Lung and browder chart)			In adults (Rule of nine: Wallace's formula)
	1-4 years	5-9 years	10-14 years	Adult
Head and Neck	19	15	13	9
Trunk (front)	16	16	16	18 (Front of chest+ abdomen)
Trunk back	16	16	16	18 (Back of chest+ abdomen)
Upper limbs	19	19	19	18 (Right+left upper limbs)
Lower limbs	30	34	35	36 (Front+back of right and left lower limbs)
Genitals	0	0	1	1

- Genitals constitute 0% upto 9 years of age, and head forms the largest area in children.
- Area of palm (palmar surface), as a general rule, constitutes about 1 % of surface area both in adult and children.
- In burnt area >15% in adults and >10% in a child, the loss of circulatory blood volume must be replaced, otherwise it will cause irreversible shock.
- Burns on head, neck, trunk and genitals are said to be more dangerous than on other parts of the body.
- Infants, young children and elderly are particularly vulnerable to initial shock and subsequent complications.

Causes of death in burns

- Causes of death in burns may be divided into:
 - A) Causes of immediate death :** These are (1) neurogenic shock (primary shock), (2) hypovolemic shock (secondary shock), (3) suffocation, due to inhaled CO, CO₂, (4) Cyanide intoxication, (5) Fat embolism, (6) Cerebral or pulmonary edema, and (7) accidental injuries during burn.
 - B) Causes of delayed death :** These are (1) renal failure (acute tubular necrosis), (2) infections (sepsis), gangrene, tetanus and (3) centrilobular necrosis of liver.

Important postmortem findings in burns

- One of the most important characteristic of antemortem burns is the finding of 'Soot and carbon particles' in larynx, trachea and may be in lungs.
- There is increased carboxy-hemoglobin (>5%) which gives cherry red colour to post mortem lividity. Victim was alive when the burn occurred, i.e. antemortem burn.
- Various levels of cyanide is found in blood, depending upon the materials burning in fire. But the levels are less than 0.3% mag (normal is zero).
- Pugilistic attitude (boxing/fencing/defence

attitude) : It is heat stiffening caused by denaturation and coagulation of proteins. It is indicative of exposure to intense heat. There is flexion at all joints and clawing of fingers. This phenomenon occurs both in antemortem and postmortem burns.

- **Heat ruptures (heat splits fissure) :** In severe burns, skin splits frequently especially over extension surfaces (e.g. thigh, back of arm) and joints. These are multiple and may be several centimeters in length. They may be confused with incised wounds. Differentiating features of heat rupture are—
 1. Presence of intact nerves, blood vessels and connective tissue in the floor of rupture
 2. Absence of bleeding in the wound, since heat coagulates the blood in vessels.
 3. Irregular margins
 4. Absence of bruising or other vital reactions in margin.
- **Heat hematoma :** It is a extradural hematoma which occurs on exposure of head to intense heat. It is usually bilateral and diffuse, but without any external signs of injury to head. It is soft, friable, chocolate colored, and sickle shaped with honeycomb appearance.
- **In antemortem burns :** Following are present : (i) signs of inflammation, (ii) signs of vital reaction, (iii) red line of demarcation, (iv) true blister (vesicle) containing protein (albumin) and chloride, (postmortem blister contains air and thin clear fluid with hard, dry and yellow base) (v) there is increase enzymatic reaction and sulphhydryl (-SH) group on periphery of burns, (vi) there is increased serotonin and histamine and (vii) sings of healing and repair.
- Curling duodenal ulcer may occur if the death is after 1 week.
- Presence of carbonmonoxide in blood—detected by Kunkel's test.
- Heat fracture may be seen in skull.

2. Other Thermal Injuries

(a) Electric burns

- Electric burns are at time, also referred to as Joule burns. Technically, joule burn is an endogenous burn, i.e. burns produced due to release of heat from the body, on application of electric current. Electric burns may be of following types :

1. Contact burns : Due to contact with live wire.
2. Spark burns : Due to sparking of current, e.g. in loose electrical fitting.
3. Flash burns : Caused on being near the main power line, without actual contact. Burns result due to arcing of current from the lines.

- Characteristic features of electric burns are—

1. There may be holes in clothes or shoes.
2. There is a wound of entry and wound of exit of electric current :

i) **Entry wound** : It is non-bleeding thick, leathery, greyish white, depressed, hard and cauliflower like, known as crater formation. High voltage current may cause burns over large areas of skin. i.e. crocodile skin lesions. The skin may get coloured due to metallic pigment : green (in brass electrode), black (in iron electrode), blue (in copper electrode) and grey (in aluminium electrode).

ii) **Exit wound** : It is like a laceration and is bleeding.

3. Metals from electrode may melt and as small balls (current pearls) may be carried to tissue. Calcium phosphate of bones may also melt and is radiologically seen as bone pearls (wax dripping).

4. Muscles show Zenker's degeneration.

Cause of death in electric burn

Commonest cause of death is ventricular fibrillation. Other causes include shock, cardiopulmonary arrest, cerebral anoxia, paralysis of respiratory muscles, and mechanical injuries due to fall.

(b) Lightning burns

Lightening refers to discharge of current

between a negative charged cloud and positively charged article on earth. During lightening, injuries result due to following mechanisms :

- i) Direct effect of high voltage current.
- ii) Heat, i.e. super heated air causing burns
- iii) Expanded and displaced air, which acts as a blast wave
- iv) Sledge hammer blow by compressed air pushed before the current. (sledge hammer effect and blow death).

- The characteristic finding in lightening burns is filigree burns /arborescent burns/arborescent marking/Litchenberg figure. In this burns are seen as coloured branching patterns, especially on shoulder and flanks. This branching distribution like inverted tree, does not correspond to blood vessels.

Dowry Death

In some cases newly married girls are abused, harassed, cruelly treated and tortured by the husband, in-laws and their relatives for or in connection with any demand for dowry. In extreme cases, the woman is killed by burning or some other method. Law in relation to dowry death are :

Law prescribing punishment and definition (section 304 B IPC)

Husband or (his any) relative will be tried under section 304 B, IPC and shall be deemed to have caused her death, if a woman dies due to bodily injury or burns or otherwise in suspicious circumstances within 7 years of marriage and it shown that soon before her death she was subjected to harassment or cruelty by them, in connection with, any demand for dowry. Such death shall be called dowry death. Punishment includes imprisonment of not less than 10 years, but which may extend to life imprisonment.

Law prescribing punishment for causing cruelty to a married women (Sec. 498A, IPC)

Husband or (his any) relative will be tried under section 498 A, IPC for causing cruelty to a married woman. Cruelty is defined as any willful conduct

which drives the woman to commit suicide or grave physical or mental injury to her or harassment of the women with a view to coerce (intimidate) her for dowry. Punishment includes imprisonment which may extend upto 3 years and fine.

Other law

- **Section 174 (3) CrPC** : Autopsy is compulsory in all cases of unnatural death of a female within 7 years of marriage (i.e. dowry death) or if she is less than 30 years of age (Note : Section 174 CrPC allows police inquest for any case).
- **Section 176, CrPC** : Authorize magistrate

inquest for investigation of dowry death.

- **Section 113 A, IEA** : Deals with presumption as to abetment (encouragement) of suicide by a married woman.
- **Section 113 B, IEA** : Deals with presumption as to dowry death.

Dowry Prohibition Act (1961)

According to Dowry Prohibition act (1961), if any person gives or takes or abets the giving or taking dowry is punishable with imprisonment for a term which shall not be less than 5 years and with a fine which shall not be less than 15000 rupees or the amount of the value of such dowry, whichever is more.

Syllabus

1. Medico-legal aspects of pregnancy, delivery, infanticide and battered baby syndrome.
2. Abortion, Medical Termination of Pregnancy (MTP) Act and Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT) Act.
3. Medico-legal aspects of artificial insemination and surrogacy.

Learning objectives

1. Define pregnancy, delivery, infanticide and battered baby syndrome along with their medico legal aspects.
2. Define and classify abortion, MTP Act and PCPNDT Act.
3. Describe Surrogacy (Regulation) Act 2021 and the Assisted Reproductive Technology (Regulation) Act 2021.

Total - 5 hours (Lecture :02 hour, Non-lecture: 03 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

Pregnancy

Pregnancy is a physiological state in female where she conceives and carries developing product of conception in her womb until birth of a child.

Medico-legal Importance

A) Civil cases :

1. **Nullity of marriage:** If a female is pregnant before marriage from another person and she concealed the pregnancy at the time of marriage with other man to whom she get married then the marriage can be declared as null and void.
2. **Divorce:** Pregnancy resulted in a female who had no access (i.e. she had not done sexual intercourse with her husband) to her husband within the reasonable period matching with the duration of pregnancy then a decree of divorce may be allowed to the husband.
3. In case of breach of promise of marriage
4. **In alimony:** In divorce cases, pregnant women are allowed higher maintenance allowance.

5. Inheritance of property

6. Blackmailing

7. Defamation

8. Compensation cases: If a husband of pregnant woman dies due to negligence of another person, higher compensation is paid.

9. Pregnancy may be taken as a plea to avoid court.

B) Criminal cases :

1. Pregnancy is a positive proof of sexual intercourse in rape cases.
2. Pregnancy may be cause for suicide in unmarried female.
3. Pregnancy may be motive for murder if that pregnancy is due :
 - To sexual intercourse by man with woman (illicit sexual intercourse)
 - Murder may be done by husband when husband suspects that his wife is pregnant by another person (infidelity of wife).
4. Execution of death sentence: Under Section

416 of CrPC, there can be postponement of capital sentence of pregnant woman – if woman sentenced to death is found to be pregnant, the High Court shall order the execution of the sentence to be postponed and may, if it thinks fit, commute the sentence to imprisonment for life.

5. Pregnancy related with criminal abortion or concealment of birth.

Delivery

Delivery is the expulsion or extraction of a viable fetus out of womb at term.

Medico-legal importance

A. Civil Cases

1. Feigned (pretended) delivery and suppositious child
2. Affiliation and adoption cases
3. Contested paternity
4. Legitimacy of child
5. Nullity of marriage
6. Divorce
7. Inheritance of property
8. Higher maintenance allowance (alimony) in divorce cases
9. Higher compensation in compensation cases

B. Criminal Cases

1. Abortion
2. Infanticide
3. Concealment of birth
4. Blackmail
5. Delay in execution of judicial death sentence up to 6 months after delivery
6. Delivery of child as a evidence of rape
7. Homicide and suicide

Impotence

Persistent inability to develop or maintain a penile erection sufficient to conclude coitus to orgasm and ejaculation.

Types of Impotence

1. Temporary
2. Permanent

Causes

- a. Endocrine causes - Testicular failure, hyperprolactinemia
- b. Disease of penis - Peyronie's disease, previous priapism, penile trauma
- c. Disorders of CNS and spine
- d. Vascular disorders– Atherosclerotic occlusion or stenosis of cavernosa arteries
- e. Drug induced - H₂ blockers e.g. Cimetidine, Spironolactone, Ketoconazole, Beta blockers
- f. Age –at the extreme of age.
- g. Congenital anomaly or local acquired causes- Absence of male genital organ, Klinefelter's syndrome, Cryptorchidism, Phimosis, Epispadias, Partial or total amputation of penis, Lesion of CNS or spinal cord including injury to spinal cord
- h. Chronic disease – diabetes mellitus, autonomic neuropathy
- i. Functional or psychological cause - Fear, timidity, anxiety, guilt sense, hypochondrias, sexual over indulgence etc.

Medicolegal Importance

A. In Civil Cases

1. Nullity of marriage and divorce - a wife may seek divorce to her impotent husband
2. In cases of disputed paternity – a man may claim that, he being impotent has not fathered the child.
3. Compensation cases – a man may claim higher compensation for an injury that has caused him impotent.

B. In Criminal Cases

1. Impotence may be taken as plea for rape cases, unnatural sexual offenses.
2. Impotence may be stated as plea for adultery.

Sterility

- Sterility means infertility - inability of a person to procreate.
- In male - inability to beget children or inability to fertilize the ovum

- In female - inability to conceive

Types

1. Relative - diminished capacity, can be corrected,
2. Absolute - incapacity and can't be treated.

On the basis of state

1. Physiological - sterility that occurs at extreme age. Ex. Child is unable to procreate at puberty but will be able to secrete semen and gains power of procreation.
2. Pathological - due to any disease a person is incapable to procreate.

Causes

A. In Male

1. Age - at extreme age
2. Malformation - hypospadias, epispadias, congenital absence of testis.
3. Diseases - azoospermia, oligospermia, orchitis, inflammatory affection of testis, epididymis, prostate gland or seminal vesicle of gonorrheal origin; varicocele.
4. Other - exposure to X-rays

B. In Females

1. Age - at extreme age
2. Malformations - absence of uterus, bifid uterus, absence of ovaries, total occlusion of vagina
3. Diseases - tuberculosis, endometriosis, gonorrhoea, polycystic ovary

Medicolegal Importance

1. Disputed paternity - the putative father may take plea that he being sterile, has not fathered the child.
2. Compensation cases - for loss of reproductive capability as a result of injury or operation or surgical operation.
3. In adoption cases - sterility can be taken as a plea for adoption purposes.
4. Absolute sterility in male may be one of indication for artificial insemination.

Sterilization

Sterilization is a procedure to make a male or female sterile or infertile without affecting the potency of that person.

Types

1. Voluntary - with the consent of both partners for contraception
2. Compulsory - by an order of government

Methods

- In male - by doing vasectomy
- In female - by doing tubectomy

Medicolegal importance

1. In failure of sterilization operation, doctors are held responsible for the unwanted pregnancy.
2. Adultery - failure of vasectomy in male
3. Disputed paternity
4. Legitimacy of child
5. Divorce

Abortion

Definition

Expulsion of the product of conception (embryo or fetus) before it can survive outside the uterus termed as abortion.

Type

1. Natural (Spontaneous or accidental) abortion : It occurs naturally or spontaneously without any intervention.
2. Artificial abortion : It occurs as result of direct interference with the pregnancy. Artificial abortion may :-
 - i) Legal (justifiable) abortion : It comes under medical termination of pregnancy (MTP) act.
 - ii) Criminal abortion : It is illegal

Criminal Abortion

- Section 312 to 316 of IPC deal with criminal abortions.
- Cases of criminal abortion found in :
 - Widows who prevented from re-marriage by social customs
 - In unmarried girls who have become pregnant

from illicit intercourse or when family honour is at stake.

• Methods of criminal abortion:

1. **Drugs :**

- a. Ecbolics (ergot, quinine) and
- b. Emmenagogues (synthetic estrogen, oil of savin, borax and apiol).

2. **Abortion stick :**

- By inducing uterine contraction.
- It may be a thin wooden or bamboo stick or a twig from some irritant plant such as madar (Calatrops), kaner (Nerium odorum), chitra (plumbago zeylanica) or lal chitrak (plumbago rosea).

Infanticide

Definition

Infanticide refers to killing a child after delivery to till 1 year after birth.

Medicolegal aspect

- Infanticide in India is considered equivalent to murder and is tried under section 302 IPC.
- Law considers every child as born dead and therefore in a case of infanticide, it has to be proved that the child was born alive and was then killed.
- Investigation of a case of infanticide whether the child was still born or dead born or whether it was born live.

Still born

- A still-born child is one which is born after 28 weeks of pregnancy and did not show sign of life after being completely born (i.e. he remains still— so still birth).
- Child was alive in utero just before delivery but died during the process of birth.

Dead born

- A dead born child is one which has died in utero and shows one of the following signs after it is completely born:-

1. **Rigor mortis :** Rigor mortis may occur in dead fetus before birth or at birth.

2. **Maceration :**

- Maceration is a process of aseptic autolysis.
- It occurs when a dead fetus remains in the uterus for 3-4 days surrounded by liquor amnii with exclusion of air.
- Skin slippage is the earliest sign (occurs within 12 hours).
- There is gas in the great vessels and chamber of heart (Robert's sign) except for lung and uterus, which remain unchanged for a long time, all other organs become soft, edematous and loose there morphology.
- The one important radiological sign suggestive of maceration is 'Spaulding's sign' i.e. skull becomes override each other. The smell is somewhat rancid.

3. **Putrefaction (decomposition) :**

- If the membranes are ruptured after death of fetus and air gains entry into liquor amnii, fetus undergoes putrefaction instead of maceration.
- Body is greenish, foul smelling and bloated.

4. **Mummification :** It results when there is deficient blood supply, scanty liquor and no air enters uterus. Body is thin, shrivelled dark brown and emitting smell like rotten cheese.

Live birth

Definition

- Live birth means that the child showed signs of life when only a part of the child was out of the mother, though child may not have breathed or completely born.
- Even if only a part of the body of the child is outside the body of mother and if he was alive, it is live birth. Killing of such a child amounts to infanticide.

Evidence of live birth

A) **In civil cases :** In civil cases, the evidences of witness who saw the movement/hear the cry/

felt the pulsation of heart or cord will be accepted as proof of life birth. However here cry or muscular movements does not constitute such proof because child may cry in uterus (vagitus uterinus) or in vagina (vagitus vaginalis), which may be heard outside delivery room, similarly, as cellular life continue after somatic death, muscle twitch may occur, which may be mistaken as muscle movement.

B) In criminal case : In criminal cases, court requires establishment of live birth on the opinion of an expert, founded on post-mortem examination of the body of an infant.

The points to be considered are :

- Degree of maturity
- Signs of establishment of respiration; and
- Other sings.

Battered baby

- Also called as Caffey's syndrome, child abuse syndrome, maltreatment syndrome, non-accidental injury of childhood.
- Definition: A battered child is one that suffers repetitive physical injuries inflicted by parent or guardian, which are non-accidental in nature.

Features of Battered Baby Syndrome

- Age is usually less than 2 years
- Seen slightly more in male sexes
- There is general condition of neglect in child
- Disproportionate amount of soft tissue injury and history is inconsistent with pattern of injury
- Occurrence of injuries at different times
- History given by parents are incompatible with clinical findings
- There may be history of multiple admission to hospital
- Such children usually belong to broken families, low socioeconomic strata or the child may be result of unwanted pregnancy or as a result of illegitimate sexual relationship.

Medicolegal Importance

- In India, the incidence of battered baby syndrome is less.
- If death of child occurs, a charge of homicide may be labeled against offending parent.

Virginity

- A virgin is a woman who never had any sexual intercourse. Defloration means loss of virginity.
- Signs of virginity are:-
 - Labia majora are thick, rounded, firm fleshy and elastic. They are opposed to each other to completely close vaginal orifice (in non-virgin labia majora are thin, lax and do not completely close vaginal orifice).
 - Labia minora are small, thin, pink and lies inside the labia majora (in non-virgin labia minora is enlarge, cutaneous and projecting outside labia majora).
 - Clitoris is small (it is enlarged in non-virgin).
 - Vestibule is narrow (it is spacious in non-virgin).
 - Vagina is small, narrow, tight, reddish with rugose wall (in non-virgin spacious, loose, roomy and elongated).
 - Hymen is intact (it is ruptured during defloration).
 - Fourchette and posterior commissure are intact (torn in non-virgin).
 - Fossa navicularis is normal (it is more conspicuous in non-virgin).

Hymen

Hymen is a thin, firm fold of mucous membrane present at vaginal orifice. It usually has one opening which hardly admits the tip of the little finger in a virgin. Hymen is like a tight stretched membrane. The usual shape is annular or semilunar, that is, crescentic with the broader part lying posteriorly. It may be imperforate, leaving no opening or cribriform having a number of small opening or septate having two opening. Hymen usually

ruptures at the time of first sexual intercourse and usually ruptures posterolaterally (4' or 8' O clock or 5' or 7' O clock position) or posteriorly (6' O clock position). In children, hymen is deep seated and is placed high up in vagina and therefore may not rupture during intercourse.

Hymen may not rupture even after sexual intercourse, if it is thick and elastic. A girl who has never had sexual intercourse and has intact hymen, is known as true virgin, whereas a girl having involved in sexual intercourse but still having intact hymen is a false virgin (pseudo virgin).

Differences between hymen of true and false virgins are:-

Features	True virgin	False virgin
Intactness	Hymen intact and inelastic	Hymen intact but elastic
Hymen opening	Barley admit the tip of little finger	Admits two fingers easily
Edges	Distinct	Undulated

- It is difficult to say on the basis of intactness of hymen whether a woman is true virgin or false virgin. Therefore, accessory signs should be examined; in false virgin (i) Labia majora is flashy and lax and not fully cover vaginal orifice (ii) Labia minora are cutaneous and not covered by labia majora, (iii) Clitoris is enlarged (iv) Vestibule is gaping, (v) Fourchette is torn, and (vi) Vagina is spacious. All these are signs of non-virgin women.

- Hymen can also be rupture without sexual intercourse in following conditions-

- Local injury to hymen
- Injury to genital area, or fall on a projected substance injuring genital area.
- Surgical operation or gynecological examination.
- Masturbations with a large foreign body.
- Sanitary tampons

vi) Ulceration from diphtheria, fungus on other disease.

vii) Salapith is a weed which is introduced into vagina and the girl is made to sit in a tub of water. Pith absorbs water and swells up.

viii) Constant itching due to thread worm, fungal infection or poor hygiene.

- Hymen cannot rupture by separation of thighs, running, jumping, cycling, swimming, horse riding and dancing.
- Glaister keene rods may be used to determine the degree of rupture of hymen and whether the rupture is recent or old.

Artificial insemination

Artificial insemination is a procedure of transferring semen into the reproductive system of a woman other than coitus.

Types : It is of following types :

- Artificial insemination husband (AIH): Here semen of husband is used.
- Artificial insemination donor (AID): Here semen of donor is used.

Indications

1. AIH

- When husband is impotent but fertile.
- When husband is unable to deposit semen in vagina due to defect or malformation, for example, hypospadias, epispadias etc.

2. AID

- Husband has non-obstructive azoospermia i.e. sterile.
- Husband has a hereditary genetic defect.
- The couple has Rh incompatibility.
- When woman is iso-immunized and has lost previous pregnancies and intrauterine transfer is not possible.
- Husband has severe oligospermia and couple does not wish to undergo any of the sophisticated ART such as ICSI.

Medico-legal Importance

- 1) Legitimacy of child
- 2) Adultery
- 3) Nullity of marriage and divorce
- 4) Incest

Legitimacy

- **Legitimate is a child, who born either (Section 112 IEA):** (i) During continuation of a legal, valid marriage between his parents. or (ii) Within 280 days of dissolution of marriage, the mother remaining unmarried.
- The following are important terms in relation to legitimacy :
 - i) **Superfecundation** : Two ova are released in the same cycle get fertilized, either during the same act of coitus or during the separate acts. There is a possibility of the twin having two fathers.
 - ii) **Superfetation** : (i) During the continuation of development of fetus, another ova released in a subsequent cycle get fertilized and starts developing as a second fetus. This can result in (a) Twin having two father, (b) Two children being born together with different stages of development, (c) Female may deliver twice within 1-3 months.
 - iii) **Suppositious child** : Child presented by the mother to have been delivered by her, though she has not delivered, i.e. fictitious claim of child.
 - iv) **Posthumous child** : Child born after the death of his biological father.
 - Disputed paternity or maternity can be solved by :
 - i) Examination of blood groups
 - ii) HLA typing
 - 3) DNA finger printing
 - 4) Resemblance of features and behavioral patterns with mother or father (Atavism refers to resembles of features of a child with grand-parents).

Medical Termination of Pregnancy (MTP) Act

India was one of the first countries which legalized induced abortion through the Medical Termination of Pregnancy Act of 1971. According to this act, a woman can legally have an abortion if its pregnancy carries the risk of grave physical injury or endangers her mental health, if it is a result of contraceptive failure in a married woman, if it is the consequence of rape, or if it is likely to result in the birth of a child with physical or mental abnormalities. In such circumstances, abortion is permitted up to 20 weeks of pregnancies without any need for spouse consent.

MTP Amendment Bill 2020

Now there is amendment in MTP Bill in March 2020 of Ministry of health and family welfare. The Bill increases the time period of abortion :

- a) Abortion to be done on the advice of one doctor up to 20 weeks
- b) Abortion to be done between 20 to 24 weeks on the advice of two doctors in case of certain categories of women.
- c) Pregnancy may be terminated after 24 weeks in case of substantial foetal abnormalities decided by State level medical board.

An attempt to provide safeguard against indiscriminate abortion was made in the Medical Termination of Pregnancy Act in India in 1971, and has been enforced in April 1972. The provision of act has been revised in 1975.

The Conditions under which a pregnancy can be terminated under the MTP Act 1971 are as follows :

1. **Medical**: Where continuation of the pregnancy might endanger the mother's life or cause grave injury to her physical or mental health.
2. **Eugenic**: Where there is substantial risk of the child being born with serious handicapped due to physical or mental abnormalities.
3. **Humanitarian**: Where pregnancy is the result of rape, both in major and minor girl and in mentally imbalanced women.

4. Socio-economic: Where actual or reasonably foreseeable environments (whether social or economic) could lead to risk injury to the health of the mother.

5. Failure of contraceptive devices: The agony caused by an unwanted pregnancy resulting from a failure of any contraceptive device or method can be presumed to constitute a grave injury to the mental health of the mother. This condition is a unique feature of the Indian Law and virtually allows abortion on request.

Recommendations

- 1. The person or persons who can perform abortion :** The Act provides safeguards to the mother by authorizing only a registered medical practitioner having experience in gynaecology and obstetrics, and has assisted in at least 25 MTP.
- 2. Where abortion can be done :** The Act stipulates that no termination of pregnancy shall be made at any place other than a hospital established or maintained by the government or a place approved for the purpose of this act by government. Under the new rules, non-governmental institutions may also take up abortions provided they obtain a license from the Chief Medical Officer of the District, thus eliminating the requirement of private clinics obtaining a Board License.
- 3.** The abortion has to be performed confidentially and to be reported to the Director of Health Services of the state in the prescription form.
- 4.** Termination is permitted up to 24 weeks of pregnancy. When pregnancy exceeds 20 weeks, opinion of two medical practitioners is required.
- 5.** Pregnancy can only be terminated on the written consent of the women.
- 6.** The written consent of the guardian is necessary before performing abortion in women under 18 years of age, and in lunatics even if they are older than 18 years.

Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT)

The sex ratio is an indicator which describes the number of women per 1000 men for a given population. The child sex ratio describes the ratio of girls to boys in the age group of 0-6 years. The sex ratio of a given population is also used as a strong indicator to ascertain social health. In the developed societies where female and male enjoy equal status, the women usually outnumber men. The adverse sex ratios (where female are lesser than male) not only indicate poor social health, but also a barrier in attaining sustainable social development. Misuse of technology is a major reason for distorting child sex ratios. In order to regulate use and prohibit misuse of technology, the Pre-Conception and Prenatal Diagnostic Techniques (PC & PNDT) act enacted in 1994 and amended in 2003 is an important tool for addressing sex selective eliminations. The main purpose of the act is to prohibit and regulate the use of diagnostics techniques before and or after conception for sex determinations leading to sex selective elimination of foetus. The provision of the act encompasses creating institutional mechanisms and providing tools to monitor the use of diagnostic techniques for prohibiting sex selection. There is provision of punishment and penalty for those who violate provisions of PC & PNDT Act.

Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT) Act, 1994 is an Act of the Parliament of India enacted to stop female foeticides and arrest the declining sex ratio in India. The act banned prenatal sex determination.

Objectives

The main purpose of enacting the act is to ban the use of sex selection techniques before or after conception and prevent the misuse of prenatal diagnostic technique for sex selective abortion.

Salient features of PCPNDT

Offences under this act include conducting or helping in the conduct of prenatal diagnostic technique in the unregistered units, sex selection on a man or woman, conducting PNDT test for

any purpose other than the one mentioned in the act, sale, distribution, supply, renting etc. of any ultra sound machine or any other equipment capable of detecting sex of the foetus.

Main provisions in the act are:-

1. The Act provides for the prohibition of sex selection, before or after conception.
2. It regulates the use of pre-natal diagnostic techniques, like ultrasound machine by allowing them their use only to detect:-
 - Genetic abnormalities
 - Metabolic disorders
 - Chromosomal abnormalities
 - Certain congenital malformations
 - Haemoglobinopathies
 - Sex linked disorders.
3. No laboratory or centre or clinic will conduct

any test including ultrasonography for the purpose of determining the sex of the foetus.

4. No person, including the one who is conducting the procedure as per the law, will communicate the sex of the foetus to the pregnant woman or her relatives by words, signs or any other method.
5. Any person who puts an advertisement for pre-natal and pre-conception sex determination facilities in the form of a notice, circular, label, wrapper or any document, or advertises through interior or other media in electronic or print form or engages in any visible representation made by means of hoarding, wall painting, signal, light, sound, can be imprisoned for up to three years and fined Rs. 10,000.

Syllabus

1. Rape
2. Medico-legal aspects of sexual offences
3. Protection of Children from Sexual Offences (POCSO) Act

Learning objectives

1. Describe classification of sexual offences
2. Define rape. Describe the examination of rape victim and accused and its medico legal aspects.
3. Define the un-natural sexual offences and sexual perversion with their medico-legal aspects and give introduction to POCSO Act.

Total - 3 hours (Lecture :02 hour, Non-lecture: 01 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

Definition

- Sexual offences are defined as unlawful (illegal) sexual intercourse with a second person (man/woman) or animal to obtain sexual gratification.

Sexual offences may be—

1. **Natural sexual offences**— Refers to sexual offences involving the use of sex organs in natural way, i.e. penis and vagina are involved. Natural sexual offences are rape, adultery and incest.
2. **Unnatural sexual offences**— Refers to sexual offences involving the use of sex organs against the law of nature, e.g. sexual intercourse through anus, mouth or animals. They are a crime, even when done with consent. Unnatural sexual offences are sodomy, lesbianism (tribadism), buccal coitus and bestiality.
- **Sexual perversions**— are acts intended to result in sexual gratification without sexual intercourse.

Rape

- According to section 375 IPC, a man is said to commit rape, if he has sexual intercourse with a women:-

1. Against her will
2. Without her consent
3. With her consent if she is
 - i) Less than 16 years of age
 - ii) With his own wife less than 15 years of age
 - iii) Intoxicated or has unsound mind so that she is unable to understand the consequences.
 - iv) Consent is obtained by unlawful means, i.e. fears of death or hurt to herself or to some one whom she is interested.
 - v) Impersonation, i.e. when the man knows he is not her husband and her consent is given because she believes that he is another man to whom she is lawfully married.

Medicolegal aspects of Rape

- Statutory rape is sexual intercourse with a women below the age required/to legally

- consent the act, i.e. a girl below 16 years (if not wife) and below 15 years (if wife). In India, a woman of and above the age of 16 years can give consent for intercourse.
- Sexual intercourse by a man with his wife, even against her will is not rape, if she is above 15 years of age.
 - In India the law does not presume any limit of age under which a boy is considered physically incapable of committing rape. Similarly, there is no age limit for girl, below or above which rape cannot be committed on her.
 - Custodial rape is rape by persons who are in position or authority e.g., police officers, jail wardens, hospital staff and who abuse their position to commit the offence when the woman is under their custody/care.
 - Gang rape when a woman is raped by one or more in a group of persons acting in furtherance of their common intention, each is deemed to have committed gang rape.
 - Date rape is sexual intercourse with a woman who is given a drink containing a sedative drug like catamine, GHB, rohypnol in a party (date) without her knowledge.

Examination in a case of Rape

A. Examination of victim

- Victim cannot be examined without written informed consent. Informed written consent should be obtained if the age of victim is above 12 years. If she is less than 12 years of age or if she is mentally unsound, the written consent of parent/guardian should be taken (Sec. 90 IPC). Victim (female) should be examined by or under supervision of a female RMP (Sec. 53(2) CrPC).
- Finding which are suggestive of rape are :-
 - i) Signs of struggle on cloths (tear, blood, semen, mud etc.), body and genitals (abrasion, contusion, bites for nail marks etc).
 - ii) Presence of the semen in the Vagina (proof of sexual intercourse).
 - iii) Presence of spermatozoa in the vagina.

- iv) Locards principals of exchange states that whenever two bodies come in contact with each other, there is exchange or material between the two and so a criminal can be linked to crime. In case of rape, piece of cloth, button, hair, blood, saliva, semen or smegma from the accused may be found on the body of victim and conversely materials of victim may be found on the body of accused.
- v) Presence of smegma bacilli in vagina is suggestive of coitus.

B. Examination of accused

- An accused can be examined even without his consent (Sec. 53(A) CrPC. Findings may be :
 - i) Presence of torn frenulum is consistent with a recent intercourse.
 - ii) The presence of smegma under prepuce is inconsistent with recent intercourse as it gets rubbed off during sexual intercourse and may be deposited in Vagina. It takes about 24 hours to accumulate. Thus, absence of smegma may indicate sexual intercourse, provided no bath is taken.
 - iii) Presence of vaginal epithelial cells on penis can be detected by lugol's iodine.

Presence of smegma in vagina is suggestive of recent sexual intercourse while its presence under prepuce rules out recent intercourse.

Law related to rape

IPC section	States
375	Define rape
376	• Lays down the punishment for offence of rape which may extend from 7 years to life imprisonment and also fine unless the victim is his own wife and is not under 12 years. • In raped woman is his own wife (but not under 12 years) the imprisonment may extend to 2 year with or without fine.

sodomine there is complete relaxation of sphincter with dilatation of opening.

2. Non-habitual (forcibly victimized) : (i) Presence of semen in anus is the only confirmatory evidence, (ii) Signs of violence around anus, i.e. abrasions, figures, contusion or triangular bruised tear of posterior part of anus (in sudden violence).

Other unnatural sexual offences

- Bestiality : Is the sexual intercourse by a human being with a lower animal.
- Tribadism (Lesbianism or female homosexuality) : Sexual gratification of a woman is obtained by another woman by kissing, body contact, manipulation of breast and genitalia. Active partner is called dyke or butch and the passive agent is called femme. This is not an offence in India.
- Buccal coitus (coitus per as/sin of gomorrah): In this, the male organ is introduced into mouth, usually of a young child. Fellatio is oral stimulation of penis by male or female. Cunnilingus is oral stimulation of female genitals.

Sexual Perversions

- There are persistently indulged sexual acts in which complete satisfaction is sought and obtained without sexual intercourse.
- a) **Sadism** : Sexual gratification is obtained or increase from acts of physical cruelty or infliction of pain on one's partner. It is seen more commonly in men. To obtain sexual gratification, the sadist may bite, beat, whip, produce cuts on the victim etc.
- b) **Lust murder** : In extremes of sadism, murder serves as a stimulus for the sexual act and becomes the equivalent of coitus, the act being accompanied by erection, ejaculation, and orgasm.
- c) **Necrophagia** : (Necros=corpse; phagia=to eat) : This is extreme degree of sadism in which the person after mutilating the body, sucks or licks the wounds, bites the skin, drinks blood,

and eats the flesh of his victim to derive sexual pleasure.

- d) **Masochism** : Sexual gratification is obtained or increased by the suffering of pain. Masochists get pleasure from being beaten, abused, tortured, humiliated, enslaved, degraded or dominated by their sexual partner.
- e) **Necrophilia** : In this condition, there is a desire for sexual intercourse with dead bodies. It is said to have sadomasochistic foundation and that decomposition, foul smell, and coldness act as stimulants.
- f) **Fetishism** : A fetish is an abnormal stimulus or object of sexual desire. Fetishism means the use of such objects of sexual gratification leading to orgasm. For example underclothing, brassiere, petticoat, stocking, shoes, etc.
- g) **Transvestism or Eonism** : A transvestite (trans=opposite, vista=clothing) is a person whose whole personality is dominated by the desire of being identified with the opposite sex. His dress, manner, occupational interest, and associations are all designed to increase his feeling of being a woman. Many cases are associated with sadomasochism/bondage. There is no hormonal disturbance or genital abnormality.
- h) **Masturbation or Onanism or Ipsation** : Is the deliberate self-stimulation that effects sexual arousal. In males, it is done by moving the penis against a bed or other object. In females, fingers are gently and rhythmically moved over clitoris or labia minora or steady pressure is applied over these parts with several fingers or whole hands (it is an offence when done in public).
- i) **Exhibitionism (Sec 294 IPC)** : It is a willful and intentional exposure of the genitalia in a public place while in the presence of others to obtain sexual pleasure. May or many not be associated with masturbation (Punishment=3 months+fine).
- j) **Voyeurism or Scopophilia or Peeping tom** : Sexual gratification is obtained by looking at

the sexual organs of other persons, watching the act of sexual intercourse, or witnessing undressing by a woman.

- k) **Frotteurism** : Sexual satisfaction is obtained by rubbing against persons in crowd. If they attempt intercourse, they have a premature ejaculation or they are impotent. It is an uncommon perversion and rarely occurs alone.
- l) **Undinism** : In this, the sexual pleasure is often obtained by witnessing the act of urination by someone of the same or opposite sex.
- m) **Indecent assault (Sec 354 IPC)** : It is any offence committed on a female with the intention or knowledge to outrage her modesty. Usually, the act involves the sexual part of either or is sexually favored. In such assaults, a man may try to kiss a woman, press or fondle with her breasts, touch or expose the genitalia or thighs, try to put a finger in her vagina, play with vulva.

- A medical practitioner can be accused of indecent assault if he examines a female patient by stripping her clothes without her consent or even with her consent in the absence of a female attendant.
- Such assaults are punishable under Sec. 354 IPC, upto 2 years imprisonment and/or fine.
- n) **Uranism** : General term for perversion of the sexual instinct.
- o) **Satyriasis** : Incessant sexual desire.
- p) **Priapism** : Painful penile erection in absence of sexual desire.

Paraphilias

- A paraphilia is a condition in which a person's sexual arousal and gratification depend on fantasizing about and engaging in sexual behavior that is atypical and extreme. Thus all sexual perversions and unnatural sexual offences (e.g. homosexuality, bestiality etc.) are paraphilias.

Syllabus

1. Common symptoms associated with psychiatric disorders - Lucid interval
2. Civil and criminal responsibilities of a mentally ill person - Mental Health Act (MHA)

Learning objectives

1. Describe the symptoms commonly associated with psychiatric disorders & the significance of lucid interval.
2. Describe the civil and criminal responsibilities of a mentally ill person.
3. Describe Mental Health Act

Total - 4 hours (Lecture :02 hour, Non-lecture: 02 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

Forensic psychiatry is a subspeciality of psychiatry and is related to criminology. It encompasses the interface between law and psychiatry.

A forensic psychiatrist provides services – such as determination of competency to stand trial – to a court of law to facilitate the adjudicative process and provide treatment, such as medications and psychotherapy, to criminals.

The areas of forensic psychiatry include conflict with criminal laws, marriage issues, sexual abuses, eligibility to work, testamentary capacity and ethical issues.

Most commonly reported psychiatric disorders

1. Anxiety Disorders
 2. Mood Disorders
 3. Psychotic Disorders
 4. Dementia
 5. Eating disorders
- Insanity is characterized by certain abnormal mental and behavioral patterns. Simply insane means unsound mind. i.e. insane is the person

which has unsound mind. Conversely sanity means sound mind (compos mentis).

- **Lucid interval** is the period of sanity (sound mind) in an insane person, i.e. period in course of mental illness when there is complete cessation of manifestations of insanity. During this period he is quite normal and can make valid will, sell/purchase property, give valid evidence and is legally responsible for his deeds. The lucid interval is a long-held legal concept widely accepted in case law as a possible means of countering a challenge to testamentary and related capacities.
- Before making a diagnosis of insanity, the patient may be kept under the observation in mental hospital or general hospital/nursing home. Patient is kept under observation for 10 days, which can be extended upto maximum 30 days.
- Two doctors (at least one being a government doctor) should examine the patient separately without consulting each other for at least three examinations.

Civil and Criminal Responsibilities of a mentally ill person

(a) Civil responsibilities of insane

- Civil responsibilities are generally considered in relation to :

 1. Management of property : Insane may deprived of control and management of it and a person may be appointed by court to manage it for him.
 2. Contract : Contracts made by an insane are generally invalid, except if made during lucid interval.
 3. Marriage : Marriage can be declared invalid if one of the parties was insane at the time of ceremony.
 4. Competency as witness : Insane is not competent to give evidence, except during lucid interval.
 5. Validity of consent : Consent is not valid, if given by an insane person.
 6. Civil rights : Right to indulge in civil rights such as holding driving licence or voting is lost due to insanity.
 7. Guardianship : An insane cannot be local guardian of a minor and also cannot adopt a child.
 8. Testamentary capacity : Testamentary capacity is defined as the capacity of a person to make to valid will. An insane can not make a valid will, except in lucid interval. 'Holograph will' is one which is written by the testator in his own handwriting.

(b) Criminal responsibility of insane

- In law, criminal responsibility means liability to punishment for the crimes committed. The law presumes that every person is sane and accountable for his actions, unless contrary is proved. Also that a person who is proved to be insane is not responsible for his actions, as he is devoid of free will, intelligence and knowledge in relation to his acts.

- The criminal responsibility of an insane is judged as per the following rules :

1. MC Naughten rule (Legal test or right or wrong test) :

- Accused daniel MC Naughten (probably suffering from paranoid schizophrenia and having persecutory delusions) shot Sir Peel's private secretary. Edward Drummond, mistaking him for the prime minister Sir Robert Peel. He was found not guilty on grounds of insanity. The answers given by panel of 14 judges to house of lords to clarify the legal position (on 19 june 1843) as known as MC Naughten rule.
- It states that an accused person is not legally responsible, if it is clearly proved that at the time of committing the crime, person was suffering from such a defect of reason from abnormality of mind that he didn't know the nature and quality of act he was doing or that what he was doing was wrong i.e. a person is not responsible if he is not of sound mind.
- It is accepted in India as law of criminal responsibility and is embodied in section 84 IPC as- "nothing is an offence which is done by a person, who at the time of doing it, by reason of unsoundness of mind is incapable of knowing the nature of act, or that he is doing what is either wrong or contrary to law".
- The primary defect is that criteria for deciding insanity is purely intellectual (reason based). And there is no place for delusional beliefs, hallucinations, emotional and volitional factors and the ability of an individual to control the impulses. This is because the abnormality of mind (term used in this rule) is a legal and not a psychiatric concept and is concerned with the mind (i.e. reason, memory and understanding) not with the brain.
- Clearly proved (term) means that the mental abnormality had a direct causal relations to the offence (i.e. it would not have occurred in absence of mental abnormality).

- Crime consists of actus reus (i.e. guilty act) and mens rea (wrong intention). So if at the time of crime, the accused had the capacity to know that his act was wrong, he will be fully responsible, even if he was mentally ill, and unable to refrain from doing the act at that time.
- If an accused commits a crime under the influence of delusion, he is judged as if the delusionary facts were real. So if due to an insane delusion, a person kills a man in self defence (thinking that he is attempting to kill him or thinking that he is a wild animal) or as part of job (thinking that he is a state executioner and has to execute the victim) he has no criminal responsibility and is exempt from punishment. But due to an insane delusion, if a person thinks that another person has caused a serious injury to his fortune and character and kills him, he becomes responsible as under the law no one can kill a person in revenge.

2. Doctrine of partial responsibility

- If a person is suffering from some weakness or aberration of mind (though not completely insane), he is only partially responsible for his actions, e.g. obsessional states or depressions.

3. Durhan rule

- Accused is not responsible for the act, if his act resulted from mental disease or defect.

4. Currens rule

- A person is not responsible if at the time of committing the crime, he did not have the capacity to regulate his conduct according to the requirements of law, as a result of his mental disease or defect.

5. American law institute test

- Insane lacks the capacity to appreciate the wrongfulness of his conduct or to confirm to the requirements of law, therefore he is not responsible for crimes committed.

6. Norwegion system

- No defendant considered insane or

unconscious at the time of offence, may be punished.

Drunkenness and insanity

- Person is not responsible for his act if the intoxication was given without his knowledge or against his will. Also during insanity produced due to alcoholism, e.g. delirium tremens, he is not responsible. However voluntary intoxication is no excuse for commission of crime.

Mental Health Act (MHA)

The Mental Health Act is a law that tells people with a mental health disorder what their rights are and how they can be treated.

The term "mental health disorder" is used to describe people who have:

- A mental illness
- A learning disability
- A personality disorder

Being detained (also known as sectioned) under the Mental Health Act is when a person made to stay in hospital for assessment or treatment.

It's important that a person know what happens, when he detained, what are rights are, and where seek help.

The Mental Health Act Code of Practice tells everyone how to use this law and what they must do.

The leaflets below explain in detail:

- What information get when sectioned
- What health professionals should or shouldn't do
- What are rights and choices

Mental Healthcare Act, 2017

In India, the Mental Health Care Act 2017 was passed on 7 April 2017 and came into force from 29 May 2018.

The act effectively decriminalized attempted suicide which was punishable under Section 309 of the Indian Penal Code.

The law was described in its opening paragraph as "An Act to provide for mental healthcare and services for persons with mental illness and to protect, promote and fulfill the rights of such persons during delivery of mental healthcare and services and for matters connected therewith or incidental thereto." This Act superseded the previously existing Mental Health Act, 1987 that was passed on 22 May 1987.

It states that mental illness be determined "in accordance with nationally and internationally accepted medical standards (including the latest edition of the International Classification of Disease of the World Health Organization) as may be notified by the Central Government." Additionally, the Act asserts that no person or authority shall classify an individual as a person with mental illness unless in directly in relation with treatment of the illness.

Revisions made from the Mental Health Act 1987

1. The Mental Healthcare Act 2017 aims at decriminalising the Attempt to Commit Suicide by seeking to ensure that the individuals who have attempted suicide are offered opportunities for rehabilitation from the government as opposed to being tried or punished for the attempt.
2. The Act seeks to fulfill India's international obligation pursuant to the Convention on Rights of Persons with Disabilities and its Optional Protocol.
3. It looks to empower persons suffering from mental illness, thus marking a departure from the Mental Health Act 1987. The 2017 Act recognises the agency of people with mental illness, allowing them to make decisions regarding their health, given that they have the appropriate knowledge to do so.
4. The Act aims to safeguard the rights of the people with mental illness, along with access to healthcare and treatment without discrimination from the government. Additionally, insurers are now bound to make provisions for medical insurance for the treatment of mental illness on the same basis as is available for the treatment of physical ailments.
5. The Mental Health Care Act 2017 includes provisions for the registration of mental health related institutions and for the regulation of the sector. These measures include the necessity of setting up mental health establishments across the country to ensure that no person with mental illness will have to travel far for treatment, as well as the creation of a mental health review board which will act as a regulatory body.
6. The Act has restricted the usage of Electroconvulsive therapy (ECT) to be used only in cases of emergency, and along with muscle relaxants and anesthesia. Further, ECT has additionally been prohibited to be used as viable therapy for minors.
7. The responsibilities of other agencies such as the police with respect to people with mental illness has been outlined in the 2017 Act.
8. The Mental Health Care Act 2017 has additionally vouched to tackle stigma of mental illness, and has outlined some measures on how to achieve the same.

Syllabus

1. Hierarchy and major divisions of forensic lab services.
2. Newer techniques and recent advances - polygraphy, narcoanalysis, DNA profiling.

Learning objectives

1. Hierarchy and major divisions of forensic lab services.
2. Newer techniques and recent advances - polygraphy

Total - 1 hours (Lecture :01 hour, Non-lecture: 00 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

Introduction

There are seven central forensic laboratories in India, at Hyderabad, Kolkata, Chandigarh, New Delhi, Guwahati, Bhopal and Pune.

CFSL Hyderabad is a centre of excellence in chemical sciences, CFSL Kolkata (the oldest laboratory in India) in biological sciences, and CFSL Chandigarh in physical sciences. The CFSL New Delhi comes under the Central Bureau of Investigation, Delhi, whereas the other laboratories are under the control of the Directorate of Forensic Science Services (DFSS) of the Ministry of Home Affairs. The laboratory in New Delhi is under the control of the Central Bureau of Investigation (CBI) which investigates cases.

Hierarchy and Major divisions of Forensic lab

Organizational set up of ideal forensic science laboratories meets the accreditation requirements specified by the NABL (National Accreditation Board for Testing and Calibration Laboratories) in terms of personnel, training and development and management of evidences etc. Laboratory should be organized and operated professionally.

Purpose

- Examination of crime related exhibits referred by Police, Judiciary, and other government department and undertakings
- To provide knowledge about role of Forensic Science and its application to crime investigation to police personnel Judiciary officers and related .
- To provide scientific aids to investigation to I.Os. in investigation of crime and to help in collecting scientific evidences from scene of crime, its proper packing, sealing and forwarding to laboratory for examination.
- To give training to personnel from police, and other Forensic Institutions.
- To give lectures on Forensic Science to trainees in various Police , Judicial and other related institutions.

Organisational structure**1. Personnel**

Scientific Management of Forensic Science laboratories must have personnels with pertinent scientific qualifications and suitable forensic experience.

Director

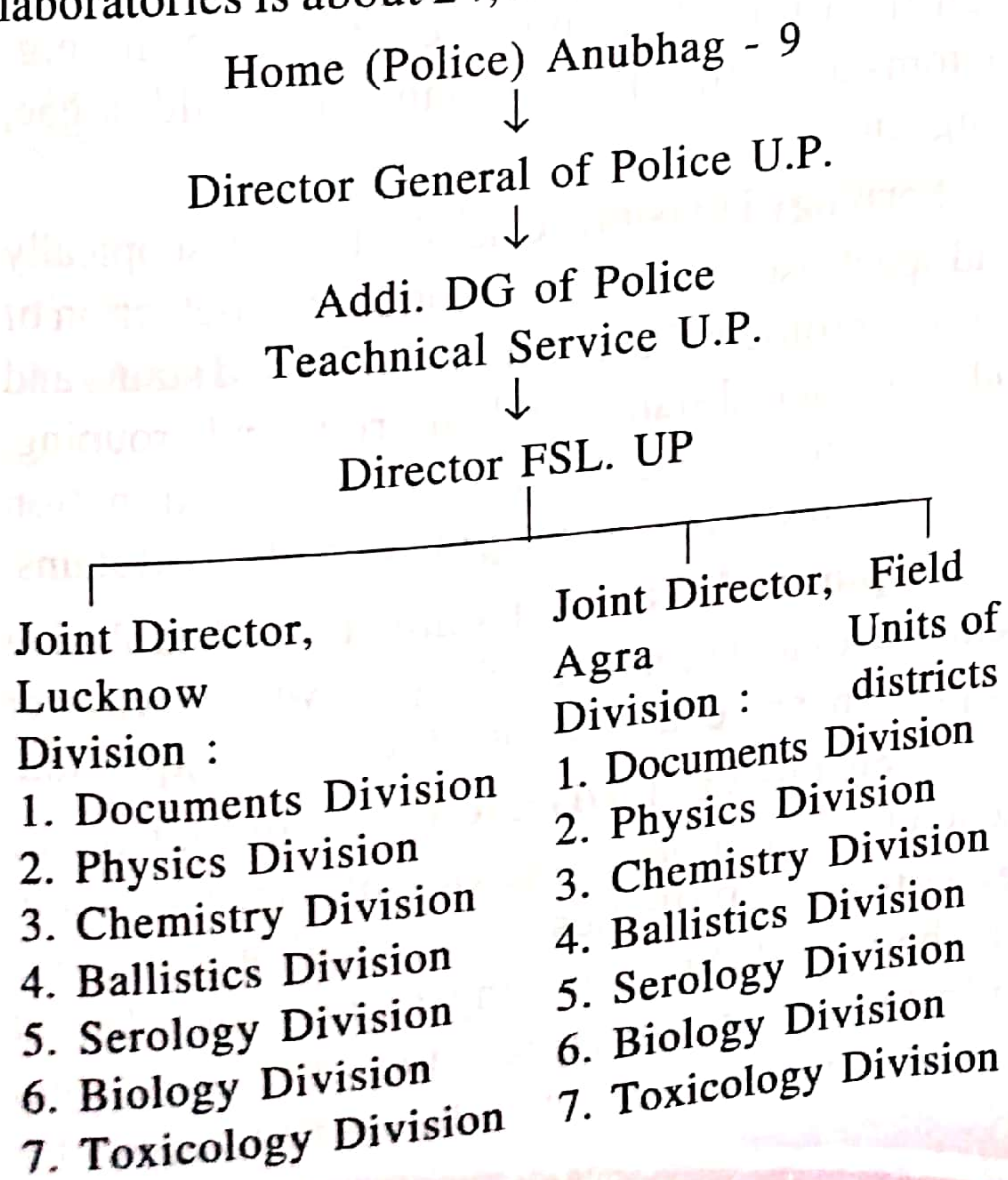
The Director of the laboratory should be a person having direct operational and administrative control of the laboratory, must have minimum qualification of M.Sc. degree. However, it is desirable to have Ph.D. degree and additional qualifications in management and administration with sufficient experience. Director must have sufficient knowledge about all the related fields; to the scientific functions and forensic aspects of the laboratory's work, preferably through an experience as a forensic scientist.

Reporting Officers

Reporting officers are in good communication skill, presence of mind and According to NABL qualifications and experience.

Example: In UP states, the hierarchy are as below.

In the year 1979, when the Government of Uttar Pradesh decided to reorganize the scientific facilities available to the investigating agencies of the state, the total number of cases referred to the laboratories at Agra and Lucknow were about 7,500 only. To-day the average input to these laboratories is about 24,000 cases.



8. Lie-detection
9. Medicolegal Division
10. Instrumental Analysis Division
8. Explosives Division
9. Instrumental Analysis Division

Staff pattern in division at Lucknow and Agra FSL

1. Assistant Director
2. Scientific Officer
3. Sr. Scientific Assistant
4. Scientific Assistant
5. Laboratory Assistant
6. Laboratory Attendant

Field Units of Districts Staff at Range Headquarters

1. Scientific Officer
2. Photographer
3. Scientific Assistant
4. Laboratory Attendant
5. Constable Driver

Minsteral staff

1. Sr. Assistant (Head Clerk)
2. Sr. Clerk
3. Accountant
4. Stenographer
5. Junior Clerk

Staff at District

1. Sr. Scientific Assistant
2. Scientific Assistant
3. Laboratory Attendant
4. Constable Driver

Other Miscellaneous Technical and class IV staff

2. Divisions of laboratories

The following seven divisions are in each of the laboratories at Lucknow and Agra:

- I. Physics Division
- II. Documents Division
- III. Ballistics Division
- IV. Chemistry Division
- V. Toxicology Division
- VI. Biology Division

VII. Serology Division

An Explosive division was also sanctioned for undertaking the examination of exploded material. This division also started functioning at Agra in the year 1987. It is expected to cater to the needs of all the districts in the State.

Physics Division : Physical examination of paint, glass, soil, ropes, strings, electrical transmission wires, textiles, lottery tickets, seals, etc; comparison of tool marks, restoration of erased identification numbers/ marks, contour matching of accidentally broken pieces for source correspondence; examination of broken glass pieces for the direction of impact etc., examination of counterfeit coins, trace elements analysis for the comparison and identification of exhibits.

Documents Division : Comparison of questioned writing, typewriting, printed matter, signatures with the known standards to establish genuineness or forgery; examination of documents for erasures, alterations obliterations and secret writing, decipherment of indented writings ; determination of relative age of the writings/ papers, examination of the charred documents etc.

Ballistics Division : Examination of fire arms for their service ability and to find out whether they come under the preview of Arms Act, determination of probable type or make of firearms from fired bullets/ cartridges, wads/pellets etc. to determine whether two or more bullets/ cartridge cases have been fired from the same or different fire arms, to establish the linkage of a bullet/ cartridge case with a particular firearms; to examine P.M.R./Injury report / X-ray plate/ clothes with a view to determine probable type of firearm; examination of a firearm to detect evidence of firing, checking firearms against the possibility of accidental discharge, estimation of distance of firing, identification of bullet holes/ shooter by detecting fire arm discharge residues; general examination for the reconstruction of a scene of firing etc

Chemistry Division : Examination of opium and its alkaloids, heroin, ganja, bhang, charas, and

other narcotics and psychotropic substances; examination of illicit liquors, varnish, petrol, diesel, kerosene etc; examination of inflammable fluids and solids in suspected cases of arson; examination of alcoholic medicines etc; examination of dyes, inks, stains and other organic and inorganic chemicals.

Toxicology Division : Examination of viscera, stomach wash, vomit, urine and blood etc. for poisons of vegetable origin (Datura, oleander, opium, madar aconite, nux vomica, etc.) inorganic salts (arsenic, copper sulphate, cyanides etc.) acids, drugs, alkaloids, pesticides ((DDT, BHC parathion, malathion, aldrin, zinc phosphide, aluminium phosphide, etc.) Alcohols (methyl & ethyl alcohol etc.) and all other types of poisons including powdered glass, etc.

Biology Division : Examination of the biological fluids e.g. semen, saliva, sweat, urine, feacal matter etc.; histological examination of tissues of human/ animal origin; morphological examination of hair, wool, and fibers; examination of skeletal remains Bones, teeth etc for determination of origin, age, sex, stature etc.; examination of paper pulp; identification of plant portions such as seeds, leaf fragments, flowers, Pollen grains, wood , bark, twigs etc examination, identification of minute vegetable forms e.g. diatoms and other microorganism, mould, algae, fungi etc.

Serology Division : Chemical, microscopically and spectroscopic examination for the detection of blood, serological examination of blood stains and other biological stains for their origin and grouping, examination of Barr bodies for sex determination from blood stains, enzyme grouping of blood stains.

Explosive Division : Examination of explosive substances and remnants of explosive devices after explosion; and examination of scenes of explosion.

Medico-legal Division : Examination of wounds and injuries of the victim/suspects, to help experts in the Ballistics and Toxicology divisions in their work by providing them with relevant information and interpretation of post-mortem reports, and examination of Bones and Tissues for

medico-legal, opinion. Division is under the process of establishment.

Lie-Detection Division Interrogation of suspected criminals and witnesses Division is under the process of establishment.

Instrumental Analysis Examination of samples using modern instrumental methods

Division of analysis, as per requirement of different divisions in the laboratory. Division is under the process of establishment.

The application of science to crime investigation is becoming popular with the law enforcement agencies day by day. It is clearly reflected in the increase of the number of cases referred to the forensic science laboratories during the previous years.

Examinations of stains, hair, blood and blood stains

The examination of blood and blood stains is an important part of crime detection. The points that are usually required to be determined regarding stains are : (1) Nature of stain (whether the stains is blood or not) (2) the species (human or animal) from which the blood has come from; and (3) blood group.

Nature of stain (whether the stain is blood or not)

To determine the nature of stain, following tests are used :

1. Chemical tests :

- These tests are based on the peroxidase activity of haematin, which is derived from oxidation of haem of haemoglobin or methaemoglobin, present. This enzyme, in the presence of hydrogen peroxide converts colourless salts into coloured bases. Thus these tests are based on H_2O_2 and peroxidase enzyme. Tests are :

- i) Benzidine test : Greenish blue colour.
- ii) Phenolphthalein test (Kastle Meyer test) : Deep permanganate colour.
- iii) Leucomalachite green test : Bluish green or peacock blue colour.

iv) Guaiacum test : Blue colour.

v) Orthotoluidine test (Kohn test) : Blue or green colour.

vi) Amidopyrine test : Purple colour.

2. Microchemical tests :

- These tests are based on property of haem part of hemoglobin to form characteristic coloured crystals. The tests are :

1. Teichmann's haemin crystal test
2. Takayama hemochromogen crystal test
3. Luminal spray test : It is especially useful in old obscure blood stains

3. Spectroscopy :

- It is most delicate and reliable test. It is based on the principle that hemoglobin and its derivatives give characteristic absorption bands when viewed through a spectroscope.

4. Microscopy :

- Microscopic examination of RBCs is possible only in fresh stains.

Detection of species (whether the blood has come from human or animal)

- For detection of species, serological (immunological) tests are used. These tests are:

1. Precipitin test
2. Haemagglutination inhibition test (antiglobulin consumption test or absorption inhibition test).
3. Gel diffusion test
4. Double diffusion test
5. Precipitation electrophoresis
6. Latex agglutination test
7. Isoenzyme method (enzymological test)

Detection of blood group of blood stain

- These tests are :

1. Immunological (serological) : (i) absorption-elution test, (ii) absorption-inhibition test, (iii) mixed agglutination test, (iv) latex test.
2. Enzymological methods
3. Latte's crust method

Seminal Stain

Detection of seminal stains becomes important

in cases of rape, attempted rape, sexual murders of female, kidnapping, sodomy, bestiality, adultery and indecent assault etc. Seminal stains are generally found on the clothing, but may be present on the body of the victim or accused, on the bed clothes, site of offences, seat of motor car; on the floor or on the grass.

Tests to detect semen are :

A) Chemical tests : These tests are divided into :

- i) Microchemical tests : Florence test (produces brown crystals of choline periodide) and barberio's test (produces yellow crystals of spermine picrate).
- ii) Enzyme tests : Acid phosphatase (concentration > 10 K.A./ml), creatinine phosphokinase (> 400 units) and specific glycoproteins (P30 or MHS-5).
- iii) Ammonium molybdate test : It gives deep yellow colour, due to presence of phosphorus.

B) Microscopic examination : It is done to demonstrate the presence of spermatozoa in the vaginal fluid or in stain.

C) Biological examination : These test are :

- i) Precipitin test : To know the species to which semen belongs.
- ii) Blood group can be known from semen.

D) UV light : Invisible, softened and dry semen stains of the clothes can be rendered distinct by the filtered UV light, which produces bluish

fluorescence.

E) Testes for determination of specific protein component (e.g. LDH isoenzyme) : These are immunoelectro-phoresis, gel diffusion precipitation, gel electrophoresis, immunodiffusion, isoelectric focussing and TLC (thin layer chromatography).

Hair

The detection of hair upon weapons, vehicles, blood stains or upon the clothing or person of the victim or assailant form commonly a very important chain in evidences of cases of murder, assault, vehicular accidents, rape and unnatural sexual offences.

Examination of hair is of importances in :

1. Identification : Identification of individual which may be accused, victim, mutilated body etc.
2. Source : Source of origin, whether animal or human.
3. Sexual offences : Rape and unnatural sexual offences.
4. Crimes : Hair or fibres found at the scene on weapons or clothes helps in identification of accused/victim.
5. Hit and run case : When specimens of hair removed from various parts of the motor car are sent by authorities for comparison with victim's hair.
6. Chronic poisoning by metals : Arsenic, antimony, radium and thallium.

Human hair Vs animal hair

Trait	Human hair	Animal hair
General	Fine and thin	Coarse and thick
Cuticle	Scales short, broad, flattened/thin	Scales large, wavy projections/ step-like projections
Cortex	Thick, 4-10 times as broad as medulla	Thin, rarely more than twice as broad as medulla
Medulla	Varies, narrow, continuous, fragmented or absent, medullary index < 1/3	Continuous, wider medullary index > 1/2
Pigment	Evenly distributed	Present near the medulla
Precipitin test	Specific for human	Specific for animal

Identification of race by hair

- Indian : Straight, black, long and fine
- Chinese and Japanese : Straight, black, long and thick
- Europeans : Straight, light brown, reddish or grey and short.
- Negroes : Woolly, curly, black, short and thick.

Newer Techniques And Recent Advances - Polygraphy, Narcoanalysis, DNA Profiling

1. Polygraphy

A polygraph (often incorrectly referred to as a **lie detector test**) is a device or procedure that measures and records several physiological indicators such as blood pressure, pulse, respiration, and skin conductivity while a person is asked and answers a series of questions.

The belief underpinning the use of the polygraph is that deceptive answers will produce physiological responses that can be differentiated from those associated with non-deceptive answers; however, there are no specific physiological reactions associated with lying, making it difficult to identify factors that separate those who are lying from those who are telling the truth.

Procedure

The examiner typically begins polygraph test sessions with a pre-test interview to gain some preliminary information which will later be used to develop diagnostic questions. Then the tester will explain how the polygraph is supposed to work, emphasizing that it can detect lies and that it is important to answer truthfully. Then a "stim test" is often conducted: the subject is asked to deliberately lie and then the tester reports that he was able to detect this lie. Guilty subjects are likely to become more anxious when they are reminded of the test's validity. However, there are risks of innocent subjects being equally or more anxious than the guilty.

Then the actual test starts. Some of the

questions asked are "irrelevant" ("Is your name Fred?"), others are "diagnostic" questions, and the remainder are the "relevant questions" that the tester is really interested in. The different types of questions alternate. The test is passed if the physiological responses to the diagnostic questions are larger than those during the relevant questions.

Criticisms have been given regarding the validity of the administration of the Control Question Technique. The CQT may be vulnerable to being conducted in an interrogation-like fashion. This kind of interrogation style would elicit a nervous response from innocent and guilty suspects alike.

Effectiveness of Polygraphy

there is some debate in the scientific community regarding the efficacy of polygraphs, assessments of polygraphy by scientific and government bodies generally suggest that polygraphs are inaccurate, may be defeated by countermeasures, and are an imperfect or invalid means of assessing truthfulness. Despite claims that polygraph tests are between 80% and 90% accurate by advocates, the National Research Council has found no evidence of effectiveness. In particular, studies have indicated that the relevant-irrelevant questioning technique is not ideal, as many innocent subjects exert a heightened physiological reaction to the crime-relevant questions.

2. Narcoanalysis

The term Narco Analysis is derived from Greek word *narkc* (meaning anesthesia or torpor).

Narco analysis is used to describe a diagnostic and psychotherapeutic technique that uses psychotropic drugs, particularly barbiturates, to induce a stupor in which mental elements with strong associated affects come to the surface, where they can be exploited by the therapist.

The term Narco Analysis was coined by Horselley. Ever since the first reported use of criminal narco analysis in 1922, the process has been under the scanner with absolutely unflattering

results. Narco Analysis was rather unheard in India till recent past. However, it has been in the news in the past one year as a new investigation technique by various investigative agencies in India.

Testing Procedure

The narco analysis test is conducted by mixing 3 grams of Sodium Pentothal or Sodium Amytal dissolved in 3000 ml. of distilled water. Narco Test refers to the practice of administering barbiturates or certain other chemical substances, most often Pentothal Sodium, to lower a subject's inhibitions, in the hope that the subject will more freely share information and feelings. A person is able to lie by using his imagination. In the narco Analysis Test, the subject's inhibitions are lowered by interfering with his nervous system at the molecular level. In this state, it becomes difficult though not impossible for him to lie. In such sleep-like state efforts are made to obtain "probative truth" about the crime.

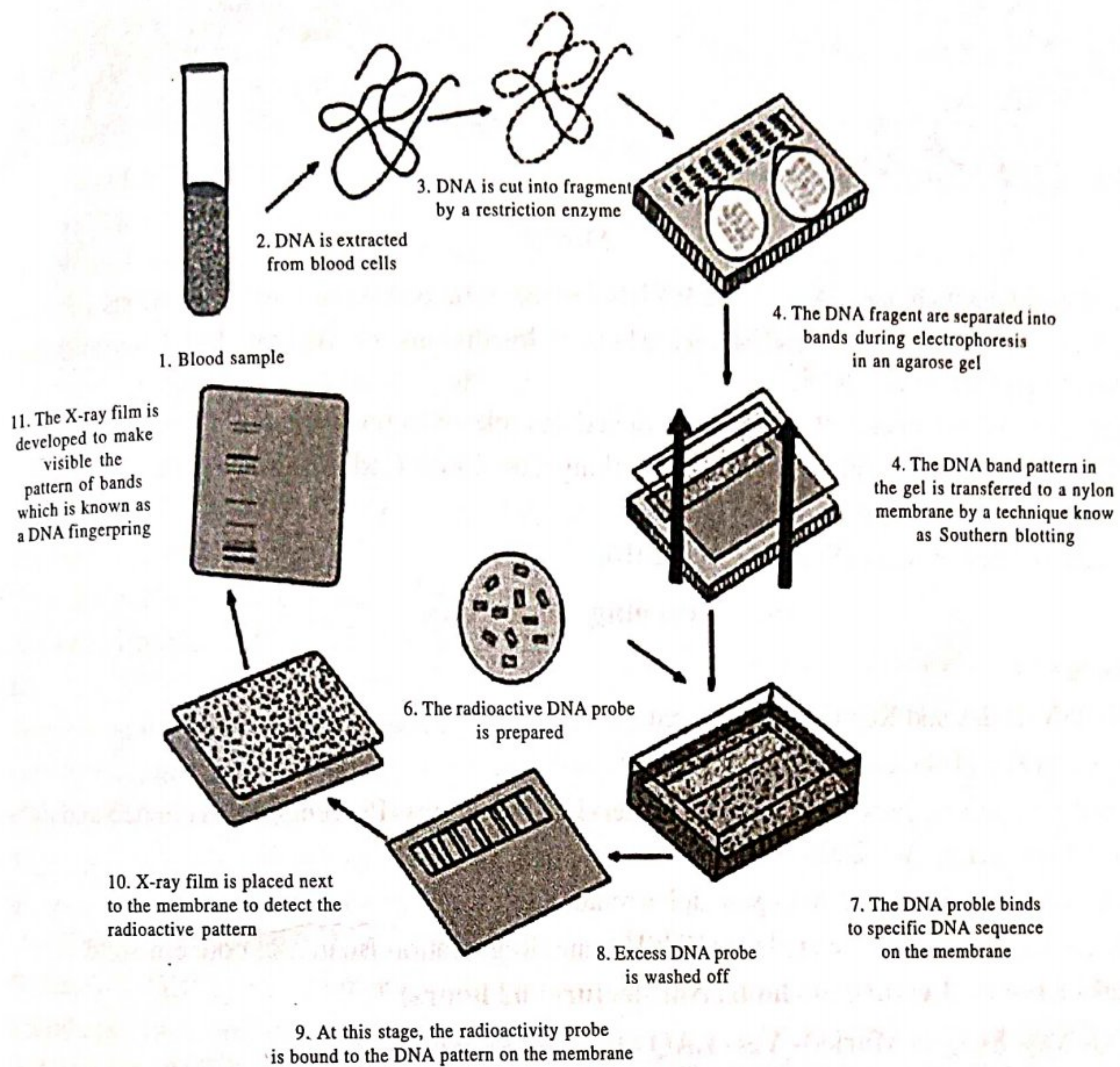
Experts inject a subject with hypnotics like Sodium Pentothal or Sodium Amytal under the controlled circumstances of the laboratory. The dose is dependent on the person's sex, age, health and physical condition. The subject which is put in a state of Hypnotism is not in a position to speak up on his own but can answer specific but simple questions after giving some suggestions. The subject is not in a position to speak up on his own but can answer specific but simple questions. The answers are believed to be spontaneous as a semi-conscious person is unable to manipulate the answers. Wrong dose can send the subject into coma or even result in death. The rate of administration is controlled to drive the accused slowly into a hypnotic trance.

The effect of the bio-molecules on the bio-

activity of an individual is evident as the drug depresses the central nervous system, lowers blood pressure and slows the heart rate, putting the subject into a hypnotic trance resulting in a lack of inhibition. The subject is then interrogated by the investigating agencies in the presence of the doctors. The revelations made during this stage are recorded both in video and audio cassettes. The report prepared by the experts is what is used in the process of collecting evidence. This procedure is conducted in government hospitals after a court order is passed instructing the doctors or hospital authorities to conduct the test. Personal consent of the subject is also required.

3. DNA profiling

- DNA profiling is the process of determining an individual's DNA characteristics, which are as unique as fingerprints.
- The primary purpose of forensic DNA profiling is to obtain a DNA 'fingerprint' from a biological sample and compare this to profiles obtained from DNA from a crime scene, an individual or profiles stored on a database.
- DNA testing can help solve crimes by comparing the DNA profiles of suspects to offender samples. The collection of blood, semen, saliva and hair etc. samples from convicted criminals and suspects. DNA profiles are then kept on a database.
- The chances of two unrelated individuals sharing the same sequence is one in a billion, or higher. Only uni-ovular twins have the same sequences.



Syllabus

1. Clinical Establishments Act - State AYUSH registration board rules and regulations.
2. Medicare Service Persons and Medicare Service Institutions (Prevention of violence and damage or loss to property) Act, 2008.
3. Drugs and Cosmetics Act and Rules – Schedules related to poison.
4. The Occupational Safety, Health and Working Conditions Code, 2020
5. Employees State Insurance Act, 1948.
6. Rights of Person with Disability Act, 2016.

Learning objectives

Describe the

1. NCISM Rules and Regulations in force.
2. Clinical Establishments Act.
3. Medicare Service Persons and Medicare Service Institutions (Prevention of violence and damage or loss to property) Act, 2008.
4. The Drug and Cosmetic Act - schedules related to poison.
5. Rules and Regulations related to AYUSH State, Registration Boards of concern state.

Total - 5 hours (Lecture :03 hour, Non-lecture: 02 hours)

MCQ- Yes- SAQ (5 Marks)- Yes- LAQ (10 Marks)- No

Clinical Establishments Act**The Clinical Establishments (Registration and Regulation) ACT, 2010**

- The Clinical Establishments (Registration and Regulation) Act, 2010 has been enacted by the Central Government to provide for registration and regulation of all clinical establishments in the country with a view to prescribe the minimum standards of facilities and services provided by them.
- The Act has taken effect in the four States namely, Arunachal Pradesh, Himachal Pradesh, Mizoram, Sikkim, and all Union Territories except the NCT of Delhi since 1st March, 2012 vide Gazette notification dated 28th February, 2012.
- The States of Uttar Pradesh, Uttarakhand, Rajasthan, Bihar, Jharkhand, Assam and Haryana have adopted the Act under clause (1) of article 252 of the Constitution.
- The Ministry has notified the National Council for Clinical Establishments and the Clinical Establishments (Central Government) Rules, 2012 under this Act vide Gazette notifications dated 19th March, 2012 and 23rd May, 2012 respectively.
- The Act is applicable to all types (both therapeutic and diagnostic types) of Clinical Establishments from the public and private sectors, belonging to all recognized systems of medicine, including single doctor clinics. The only exception is Clinical Establishments run by the Armed forces.

Silent features of clinical establishment Act

1. "Clinical establishment" is defined as hospitals and clinics and similar facilities that offer treatment for illness in any recognised system of medicine (allopathy, yoga, naturopathy, ayurveda, homoeopathy, siddha and unani). It also includes any laboratory which offers pathological, chemical and other diagnostic services. An establishment can be owned by the government, a trust, and a single doctor establishment. The Bill does not apply to any clinical establishment owned or managed by the Armed Forces.
2. The central government shall establish a National Council of Clinical Establishments to:
 - (a) Determine the minimum standards of health care by a clinical establishment;
 - (b) Classify them into categories; and
 - (c) Maintain a national register of clinical establishments. The Council shall be chaired by the Director General of Health Services (DGHS) and 22 other members (includes consumer groups and Associations of Indian Systems of Medicine).
3. Every clinical establishment has to be registered to admit patients for providing treatment. Norms required to be met prior to registration include:
 - a. Minimum standards of facilities; and
 - b. Minimum qualifications for the personnel. It may prescribe different minimum standards for each category of clinical establishment.
4. National Register shall be compiled within two years from the date of commencement of the law and determine the first set of standards for clinical establishments within two years of setting up the Council.
5. Every state government shall establish a State/ Union Territory Council for clinical establishments. Members shall include Secretary, Health; Director of Health Services;

elected representatives from state Medical Council, Nursing Council and Pharmacy Council, and state-level consumer groups or reputed NGOs etc.

6. Authorities: The state government shall set up a district registering authority for registering clinical establishments at district level. Members shall be the District Collector, the District Health Officer and 3 members with such qualifications to be prescribed by central government. However, the District Health Officer and Chief Medical Officer shall act as registering authority for provisional registration.

7. Registrations:

- The functions of the Council include compiling state registers and hearing appeals against orders of the authority for registration.
- The central government shall notify standards for each type of clinical establishment. The Bill provides for a system of provisional and permanent registration. Provision registration may be granted for a year. For clinical establishment whose minimum standards have been notified, provisional registration will only be granted for a specified time-limit. Permanent registration shall be valid for five years and application for renewal should be made six months before expiry of registration.
- A clinical establishment, applying for permanent registration, has to submit evidence of it having complied with the prescribed minimum standard.
- The registering authority may authorise an inspection or an inquiry of any clinical establishment through a multi-member inspection team to be prescribed. A show cause notice may be issued if the authority feels that a clinical establishment is not complying with the conditions of its registration. It may also cancel the registration. The authority may enter and search in the prescribed manner after giving notice of its intention to the clinical establishment, if it suspects that an establishment is operating without registration.

State AYUSH registration board rules and regulations

The Registrar of any state is the Chief Executive Officer of the Board. Registration would be given to intuitionally qualified professional practioners.

The State Ayurvedic and Unani System of Medicine and Naturopathy Board registers the doctors of the state and shoulders the mandatory responsibility of maintaining the register.

For this, it performs the following tasks

- Providing Provisional Registration of students prior to the start of their internship.
- Permanent Registration after 2 internships.
- Amending the Permanent Registration to incorporate additional qualifications obtained.
- Cancellation of Registration and issuance of No Objection Certificate, primarily when professionals wish to transfer their registration to another state either for practice or for the purpose of employment.

Every practitioner shall display the registration certificate accorded to him/her by the State Medical Council / National Commission for Indian System of Medicine in his/her Clinic and registration number in all his/her prescriptions, certificates, and money receipts given to his/her patients by him/her.

Practitioners shall display as suffix to their names only recognized medical degrees or such certificates/diplomas and memberships/honors which confer professional knowledge or recognizes any exemplary qualification/ achievements as recognized by the relevant provisions of the Act and this Regulation.

Medicare Service Persons and Medicare Service Institutions (Prevention of violence and damage or loss to property) Act, 2008

Acts of violence causing injury or danger to the life of persons engaged in medicare services as also damage to property belonging to medicare institutions are on the increase in the century. As a

result of such incidents against medicare persons, patients visiting hospitals have to suffer tremendously. These acts are resorted to by the Relatives and alives acquaintances of patients who are not satisfied with the treatment given to the patients and sametime also by unrully elements of society. As of now, there is no law in the country to safeguard the life of the doctors, paramedical staff and others who as associated with medicare as also damage to property of medicare service institutions. It is, therefore, necessary that a suitable law be passed to prohibit violence against medicare service persons and damage to property in Medicare service institutions in the country before the situtation becomes alarming.

Clause 8 of the Bill empowers the Central Government to make rules for carrying out the purposes of the Bill. The rules will relate to matters of details only as such the delegation of legislative power is of normal character.

This BILL protect the medicare service persons and medicare service institutions from violence and damage to property and impose punishment on the offender and for matter connected therewith and incidental thereto.

1. (1) This Act may be called the Medicare Service Persons and Medicare Service Institutions (Protection from Violence and Damage to Property) Act, 2008. (2) It extends to the whole country. (3) It shall come into force on such date, as the Central Government may appoint.
2. In this Act, unless the context otherwise requires—
 - (a) "Medicare Service Institutions" mean all institutions providing medical care to people which are under the control of States or Central Government or Local Bodies Short title, extent and commencement. Definitions. Bill No. XXXVIII of 2008. 5 AS INTRODUCED IN THE RAJYA SABHA ON 13TH FEBRUARY, 2009 2 etc., including any private hospital having facilities for treatment

of the sick and used for their reception or stay; any private maternity home where women are usually received and accommodated for the purpose of confinement and anti-natal and post-natal care in connection with child birth or anything connected therewith; and any private nursing home used or intended to be used, for the reception and accommodation of persons suffering from any sickness, injury or infirmity whether of body or mind and providing of treatment for nursing or both of them and includes a maternity home or convalescent home, etc.,

(b) "Medicare Service Person" include:—

- (i) Registered Medical Practitioners, working in Medicare Institutions (including those having provisional registration).
- (ii) Registered Nurses.
- (iii) Medical Students.
- (iv) Nursing Students.
- (v) Para Medical Workers employed and working in Medicare Service Institutions;

c. "Offender" means any person who either by himself or as a leader of a group of persons or an organization, commits or attempts to commit or abets or incites the commission of violence under this Act.

d. "Violence" means activities of causing any harm, injury or endangering the life or intimidation, obstruction or hindrance to any medicare service person in discharge of duty in the medicare service institution or damage

to property in medicare service institution.

3. Any act of violence against Medicare Service persons or damage to property in a Medicare Service institution is hereby prohibited.
4. Any offender, who is found guilty of Committing an act in contravention of section 3, shall be punishable with imprisonment for a term of three years and also with fine which may extend to fifty thousand rupees.
5. Any offence committed under section 3, shall be cognizable and non-bailable.
6. In addition to the punishment specified in section 4, the offender shall also be liable to a penalty of twice the amount of purchase price of medical equipment damaged and the loss caused to the property as determined by the Court trying the offender.
 - If the offender fails to pay the penal amount under sub-section (1), the said amount shall be recovered from him under the provisions of this Act as if it were an arrear of land revenue.
7. The provisions of this Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force on the subject and save as aforesaid the provisions of this Act shall be in addition to and not derogation of any other law for the time being in force.
8. The Central Government may by notification in the official Gazette, make rules for carrying out the purpose of this Act.

S. No.	Rule	Indian Penal Code	Punishment
1.	Misbehaviour with duty Doctor, Nurse, Ward boy or other Staff	504	2 year Imprisonment
2.	Use of Abusive Language	504	2 year Imprisonment
3.	Threat to Duty Doctor	506	3-7 Years Imprisonment
4.	Attack on Duty Doctor	332, 333	1-10 Years Imprisonment
5.	Damage to property and equipment	427	3 Years imprisonment and to pay money three times of the cost

6. Forceful entry into the hospital	141,143	6 Months Imprisonmen
7. Violence against duty Docor Nurse, Ward boy or other Staff	3 & 4 of Prevention of Violency & Damage to Property Act, 2013	3 Years & Fine fifty thousand Rupees Non Bailable
8. Damages to Property of Hospital	3 & 4 of Prevention of Violency & Damage to Property Act, 2013	3 Years & Fine fifty thousand Rupees Non Bailable

Drugs and Cosmetic Act and Rules- Schedules related to poison

1. Narcotic Drugs and Psychotropic Substances (NDPS) Act

Definition

NDPS act is an act of parliament of India that prohibits a person to produce / manufacture/ cultivate, posses, sell, purchase, transport, store and / or consume any narcotic drug or psychotropic substance.

This Act repeals and renders obsolete three Acts namely –

1. The Opium Act 1857
2. The Opium Act 1878
3. The Dangerous Drugs Act 1930

According to this Act, a narcotic drug refers to the cocoa leaf, cannabis (hemp), opium, poppy straw and includes all manufactured drugs.

A manufactured drug means all the cocoa derivatives, medicinal cannabis, opium derivatives and poppy straw concentrate and any other narcotic substance or preparation, which the Central Government by notification declare.

The Act defines psychotropic substance as any substance (natural or synthetic) included in the list specified in a Schedule to the Act. The Schedule lists 77 psychotropic substances.

Under section 27 of the Act, if a person possess in a small quantity, any narcotic drug or psychotropic substance intended for personal use and not for sale or distribution, or consumes any narcotic or psychotropic substance, he shall be punished with imprisonment for a term, which may

extend to one year or with fine or with both. The small quantity as quoted in the definition means:

1. 5 gm of hashish
2. 250 mg of heroin, smack and brown sugar
3. 5 gm of opium
4. 125 mg of cocaine
5. 500 gm of ganja

- NDPS Act prohibits the cultivation of poppy, cannabis and coca plants, however restricted cultivation is allowed for medicinal or scientific purpose.
- The minimum punishment for any offense committed under the Act is 10 years rigorous imprisonment and fine of Rs. 1 lakh while maximum punishment is 20 years rigorous imprisonment and fine of Rs.2 lakh.

2. IPC (Indian Penal Code) related to poisoning

1. Sec 272 IPC – adulteration of food or drink intended for sale.
2. Sec 273 IPC – sale of noxious food or drink.
3. Sec 274 IPC – adulteration of drugs.
4. Sec 275 IPC – sale of adulterated drugs.
5. Sec 276 IPC – sale of drug as a different drug or prescription.
6. Sec 277 IPC – punishment for fouling water of public spring or reservoir.
7. Sec 278 IPC – punishment for voluntarily making atmosphere noxious to health.
8. Sec 284 IPC – negligent conduct with respect to poisonous substance.
9. Sec 304-A IPC – causing death by negligence.

10. Sec 328 IPC – causing hurt by means of poison etc. with intent to commit an offense.

3. Poisons and Relevant Act and Rules

1. The Poison Act 1919
2. The Drugs and Cosmetics Act 1940
3. The Drugs and Cosmetics Rules 1945
4. The Drugs (Control) Act 1950
5. The Drugs and Magic Remedies (Objectionable advertisements) Act 1954
6. The Prevention of Food Adulteration Act 1954
7. The Prevention of Food Adulteration Rules 1955
8. The Insecticides Act 1968
9. The Insecticides Rules 1971
10. The Water (Prevention and control of pollution) Act 1974
11. The Water (Prevention and control of pollution) Rules 1975
12. The Narcotic drugs and psychoactive substances (Amendment) Act 2001.

4. The Poison Act 1919

This Act was amended in 1958 and repealed in 1960. The Act deals with import of poisonous substances into India and regulates the grant of license for possession of certain poisonous substances and sale.

5. The Drugs and Cosmetics Act 1940

The Act was amended in the year 1964 to include Ayurvedic and Unani drugs. Under this Act, the Central Government has constituted Ayurvedic and Unani Drugs Technical Advisory Board.

- According to this Act, no person shall import or manufacture for sale or stock or exhibit for sale or distribute any patent or proprietary medicine unless it is displayed on its label or container, either the true formula or a list of ingredients contained in it, in a manner readily intelligible to the members of the medical profession.

When taking the sample of a drug or cosmetics for analysis, the drug inspector should pay the fair price of the sample and divide the samples into four portions as:

1. One portion will be resorted to the shopkeeper or vendor.
2. The second portion should be sent to the government analyzer for analysis.
3. Third portion should be retained for production in the Court when required.
4. Fourth portion should be sent to the person from whom the shopkeeper or vendor had made the purchase.

Offenses punishable under this Act shall be tried only by the Magistrate of the First Class.

6. The Drugs and Cosmetics Rules 1945

The Rules are meant for regulation of manufacture, distribution and sale of the drugs and cosmetics. It classified drugs into various Schedules as:

Schedule C	biological and other products.
Schedule E	list of poisonous substances under Ayurvedic, Siddha and Unani system.
Schedule F	vaccines and sera.
Schedule G	hormonal preparations, antihistamines, anti-cancer drugs.
Schedule H	barbiturates, amphetamines, reserpine, ergot and sulphonamides.
Schedule J	drugs claimed to prevent or cure ailments such as appendicitis, blindness, cancer, cataract, epilepsy, hydrocele etc. which must not be advertised or imported.
Schedule L	list of prescription drugs (which includes drugs from Schedule H also).

Schedule H and L drugs are required to be labeled with the words "SCHEDULE H DRUG" and "SCHEDULE L DRUG".

7. The Drugs Control Act 1950

The Act regulates the sale, supply and distribution of drugs.

It also guides the manufacture or dealer in fixing the maximum price for every drug.

8. The Drugs and Magic Remedies (Objectionable Advertisements) Act 1954

The Act bans advertisements that offend decency or morality.

It also intended to prevent self-medication and treatment that may cause harmful effects. Under this Act, advertisements of magic remedies in relation to treatment of certain diseases, e.g. venereal disease, increase sexual potency etc. are forbidden.

The Occupational Safety, Health (OSH) and Working Conditions Code, 2020

Right of Employees under OSH 2020

Every employee has the following rights under this code:

- It is the right of the employee to ask the employer about the information related to the employee's health and safety and enquire about the provision for the protection of the employee's safety or health in connection with the work activity in the workplace
- In case of any threat or apprehension of a serious injury or danger to life, the employee may bring it to the notice of the employer and the inspection-cum-facilitator
- In case, as mentioned above, the employer shall immediately raise a complaint against the same, in a manner prescribed by the Government
- If the employer is not satisfied with the existence of any imminent danger as apprehended by his/he employees, he/she can

refer the matter to the inspector-cum-facilitator whose decision shall be final

Health, Safety and Working Conditions of Employees under OSH Code

The Central Government has listed down a few key measures and steps which must be taken into consideration regarding the health and safety of the employee. Discussed below are the same:

- Separate washing facility for male and female employees
- Males, Females and Transgenders must be allocated separate bathing places and locker rooms
- Sitting arrangement for employees working in a standing position
- Proper first aid facilities
- Cleanliness and hygiene must be maintained at the workplace
- Portable drinking water must be made available
- Adequate lighting
- Adequate measures to avoid overcrowding

Employees State Insurance Act 1948

The Employees State Insurance Act of 1948 was instituted with the target of getting monetary help in instances of infection, maternity, and disablement and for giving health advantages to workers of processing plants and foundations and their wards. Employees state insurance act 1948 is also abbreviated as an ESIC. After implementing the employee's state insurance act 1948, all the employee's funds are regulated according to the provisions written under the act. All its functioning is regulated by the ministry of labour and employment, a statutory body launched on 24th February 1952.

The functions of this act

- Under section 17 of the constitution, the employee's state insurance act 1948 can recruit staff members. Along with this, it can also provide gratuity and some other fund related benefits to the eligible staff members.
- According to the powers of this act, it can

invest or take money from the central government sanction for providing better facilities to employees.

- The Employees state insurance act 1948, can recruit or hire the social security officers to implement practices of the act among the other bodies of India. These officers have the power to enforce the implementation of practices of this act.
- The Employee's state insurance act 1948 also collects some amount of money from the compensation of employees to regulate all its functioning and to facilitate other employees.
- The Director-General of employees states insurance act has the authority to make decisions for facilitating the act's implementation. He can also modify the implementation strategies according to the need.
- It is the responsibility of the employee's state insurance act 1948 to maintain the budget of all expenditures, which are done to provide compensation and other facilities to the employees.

Benefits of Employees State Insurance Act 1948

Employees state insurance act 1948 comes into consideration for providing the compensation benefits to the employees. Along with this, it also has several benefits, which are catalogued below:

1. **Medical Benefit** : Along with this, the salary of those employees does not get deducted during the period of their treatment. They also get a certain percentage of compensation if any of their family members get any severe medical illness.
2. **Maternity Benefit** : It is the best benefit provided to the women by the employee's state insurance act 1948. Women who are pregnant get extra leave before and after their delivery. It means pregnant women are not required to join the office for some months before and after their delivery. They will receive their full salary during their maternity leave.

3. **Disablement Benefit**: Employees state insurance act 1948 also provides extra benefits to those who are differently abled. It provides extra reservations to disabled individuals of various categories.

4. **Unemployment Benefits**: Employees state insurance act 1948 also provides some monthly compensation to those unemployed and eligible to perform jobs. Along with this, it also provides loans to the persons who want to launch their startups. They can take the loans at lower interest under this act.

5. **Insurance Benefits**: Employees state insurance act 1948 provides insurance benefits to both government and private employees.

Rights of Persons with Disability Act, 2016

The Act replaces the Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995. It fulfills the obligations to the United National Convention on the Rights of Persons with Disabilities (UNCRPD), to which India is a signatory.

According to the The Rights of Persons with Disabilities (RPwD) Act, 2016, enacted on 28.12.2016 and came into force from 19.04.2017, Disability has been defined based on an evolving and dynamic concept. .

Features of the Act

- Disability has been defined based on an evolving and dynamic concept.
- The types of disabilities have been increased from existing 7 to 21 and the Central Government will have the power to add more types of disabilities. The 21 disabilities are given below:-

1. Physical Disability

Locomotor Disability	Leprosy Cured Person, Cerebral Palsy, Dwarfism, Muscular Dystrophy, Acid Attack Victims
Visual Impairment	Blindness, Low Vision
Hearing Impairment	Deaf, Hard of Hearing

Verbal impairment Speech and Language Disability

2. Intellectual Disability
 - Specific Learning Disabilities
 - Autism Spectrum Disorder
3. Mental Behaviour (Mental Illness)
4. Disability caused due to-
 - Chronic Neurological Conditions such as: Multiple Sclerosis, Parkinson's Disease
 - Blood Disorder: Haemophilia, Thalassemia, Sickle Cell Disease
5. Multiple Disabilities
 - Persons with "benchmark disabilities" are defined as those certified to have at least 40 per cent of the disabilities specified above.

Rights and entitlements

- Responsibility has been cast upon the appropriate governments to take effective measures to ensure that the persons with disabilities enjoy their rights equally with others.
- Additional benefits such as reservation in higher education (not less than 5%), government jobs (not less than 4 %), reservation in allocation of land, poverty alleviation schemes (5% allotment) etc. have been provided for persons with benchmark disabilities and those with high support needs.
- Every child with benchmark disability between the age group of 6 and 18 years shall have the right to free education.
- Government funded educational institutions as well as the government recognized institutions will have to provide inclusive education to the children with disabilities.
- For strengthening the Prime Minister's Accessible India Campaign, stress has been given to ensure accessibility in public buildings (both Government and private) in a prescribed time-frame.

Guardianship

- The Act provides for grant of guardianship by District Court under which there will be joint decision – making between the guardian and the persons with disabilities.

Establishment of Authorities

- Broad based Central & State Advisory Boards on Disability are to be set up to serve as apex policy making bodies at the Central and State level.
- Office of Chief Commissioner of Persons with Disabilities has been strengthened who will now be assisted by 2 Commissioners and an Advisory Committee comprising of not more than 11 members drawn from experts in various disabilities.
- Similarly, the office of State Commissioners of Disabilities has been strengthened who will be assisted by an Advisory Committee comprising of not more than 5 members drawn from experts in various disabilities.
- The Chief Commissioner for Persons with Disabilities and the State Commissioners will act as regulatory bodies and Grievance Redressal agencies and also monitor implementation of the Act.
- District level committees will be constituted by the State Governments to address local concerns of PwDs. Details of their constitution and the functions of such committees would be prescribed by the State Governments in the rules.
- Creation of National and State Fund will be created to provide financial support to the persons with disabilities. The existing National Fund for Persons with Disabilities and the Trust Fund for Empowerment of Persons with Disabilities will be subsumed with the National Fund.

Penalties for offences

- The Act provides for penalties for offences committed against persons with disabilities and

also violation of the provisions of the new law.

- Any person who violates provisions of the Act, or any rule or regulation made under it, shall be punishable with imprisonment up to six months and/ or a fine of Rs 10,000, or both. For any subsequent violation, imprisonment of up to two years and/or a fine

of Rs 50,000 to Rs five lakh can be awarded.

- Whoever intentionally insults or intimidates a person with disability, or sexually exploits a woman or child with disability, shall be punishable with imprisonment between six months to five years and fine.
- Special Courts will be designated in each district to handle cases concerning violation of rights of PwDs.



Question Bank

Long Essay

- Enlist the Vishopakrama described by Charaka, described any two of them in detail
- Enumerate the post mortem signs in a case of death by strangulation
- Classify Upavisha & write poisonous signs & symptoms, fatal dose, fatal period & management of kupeelu
- How to establish identification in the case of unknown body
- Define Visha. Write the lakshanas of Visha and explain how it becomes Oja Viparya.
- Define Agada Tantra. Describe the origin and types of Visha.
- Describe darveekara & mandali sarpa dansha lakshanas treatment
- Classify wounds & write the differences between suicidal, homicidal & accidental wound.
- Give derivation & definition of Agada Tantra and explain in detail its importance in Ayurveda
- Define the term Visha. How it is classified? Explain them with suitable examples
- Define "vishavarga" write their signs & symptoms. What is the importance of vishavega according to agadatantra?
- Write in detail "medical evidence", how to record the evidence in the court-explain
- Define Visha. Write about Jangama and Sthavara Visha with Clinical features and management schedule according to Charaka.
- Define asphyxia, write the general signs of asphyxial deaths.
- Explain the definition, sources, types and classification of visha in detail.
- Describe Viganusara lakshanas and chikitsa of Sthavara Visha.

- Explain Sthavara Vishadhishtanas with examples, vega lakshan and chikitsa.
- Describe the origin of Visha according to Charaka and Sushruta.
- Write the definition of Toxicology and Poison. Write the route of administration and absorption.
- What are the Visha Vegas and their treatment methods of sthavara visha
- Define & classify death, & describe in detail the different signs of death
- Write the signs & symptoms of acute of food poisoning & discuss significance of virudhahara
- Write the types of drowning, its external & internal post mortem appearances & medico-legal importance
- What do you know alarka visha? write the symptoms & treatment of poisoning
- Explain vyavahara ayurveda, write about dharma, artha, kama, & moksha importance
- Describe the symptoms, diagnosis & treatment of poisoning developed by the commonly used poisons in India
- What are the differences between burns & scald? Classify & write medicolegal aspects of burns.
- Mention the Vishopkramas described by Charaka, explain any three of them.
- Explain Modern and Ayurvedic Aspects of Strychnous nuxvomica poisoning and its treatment.
- Define Visha and its origin, also explain the difference between Ojas, Visha and Madya.
- Define the Sarpa Bhedas, write about Darveekar, Mandala, Rajila Sarpa Visha Lakshanas and their treatment.

- Define Agada Tantra. Write in detail about Madya Visha and its management with reference to alcoholism.
- Describe the veganusara lakshanas and chikitsa of Jangama Visha.
- Explain Upavishas and write in detail about the Karvira Visha.
- Write about the types of sarpa, sarpa damsha lakshanas with chikitsa. Write the chaturvimshati upkramas.
- Write in detail about vrischika visha, vrischika damsha lakshanas with chikitsa.
- Explain in detail about the lakshanas, and chikitsa of darvikara sarpa visha.
- Explain the Vishopakramas according to Charaka. Write the modern techniques of treatment for snake bite.
- Write characteristics, actions of poison, its examination, Dushivisha and its management.
- Classify Sarpa. Explain its Darvikara Sarpa lakshanas and its line of treatment.
- classify sarpadamshtra pakaras & write veganusara laxanas & chikitsa in darveekara poisoning
- define & classify injury, write about the management of accidental injuries
- define visha & described vishasya samanya chikitsa karma
- Define Dushi Visha. Describe its Lakshanas and treatment.
- Classify the mooshika visha. Explain its visha lakshanas and treatment.
- What is meant by visha vega? Explain in detail the types of vishvegas and its treatment.
- Explain the Luta Visha in detail, its classification and its treatment.
- Define Gara Visha. Write signs and symptoms of Gara Visha.
- Write a brief note on Kritrima Visha prevalent now days.
- Write the Lakshana, Bheda, Chikitsa and Sadhyasadhyata of Arsenic Poison (contemporary and classical views)?
- Write the Lakshana, Bheda, Chikitsa and Sadhyasadhyata of Mercury Poison (contemporary and classical views)?
- Explain Charakokta Chaturvimshati Upkrama with General principles of Management of Poisoning?
- Explain in detail Madataya (Alcohol Poisoning) along with the lakshanas and chikitsa.
- Explain Charakokta Chaturvimshati Upkrama, and write in detail about Hridyavarana and Sanjna sthapanam.
- Explain Jangama Vishadhishtanas with examples, vega lakshan and chikitsa.
- Explain Modern and Ayurvedic Aspects of Gloriosa superba poisoning and its treatment.
- define & classify death about the confirmation test of death
- described the vastanabha poisoning
- Write the Lakshana, Bheda, Chikitsa and Sadhyasadhyata of Lead Poisoning (classical & contemporary views)?
- Write the Lakshana, Bheda, Chikitsa and Sadhyasadhyata of Dhattura Poisoning (classical & contemporary views)?
- Write the Lakshana, Bheda, Chikitsa and Sadhyasadhyata of Ahiphena Poisoning (classical & contemporary views)?
- What is NDPS Act, 1985; explain Lakshana, Bheda, Chikitsa and Sadhyasadhyata of Bhang and Ahiphena Poisons.
- Write in detail about the Metallic Poisoning along with chikitsa of Arsenic poisoning.
- Define Alarka Visha and mention the stages and treatment of Rabbits.
- Define Agada Tantra and mention the diagnosis and general principles of visha chikitsa.
- described in detail about hanging
- described vishatinduka poisoning
- described about mechanical injuries in detail

- Write in detail about the Adhisthan bhedas of Jangam and Sthavara Visha, and explain what Antidotes are with examples.
- Explain Charakokta Chaturvimshati Upkrama, and write in detail about Nishpeedana and Arishta Bandhan.
- Explain Charakokta Chaturvimshati Upkrama, and write in detail about diagnosis and general principles of treatment.
- Define Environmental Toxicology and explain the toxic effects of chemicals and radiations are on human race.
- Define Agad Tantra and Toxicology, and explain in detail about the classification of Visha both Classical and Contemporary views.
- Define Poison and explain what are the duties of a medical practitioner in suicidal and homicidal cases of poisons.
- Write in detail about the Classical and Modern toxicological techniques for detection of Visha.
- Explain what are Jangama and Sthavara Vishas write in detail about Arsenic Poisoning, lakshanas, fatal dose and shodhana method.
- Explain what are Jangama and Sthavara Vishas write in detail about Lead Poisoning, lakshanas, fatal dose and shodhana method.
- Explain what are Jangama and Sthavara Vishas write in detail about Copper Poisoning, lakshanas, fatal dose and shodhana method.
- Explain what are Jangama and Sthavara Vishas write in detail about Mercury Poisoning, lakshanas, fatal dose and shodhana method.
- Write detailed study of Keeta Visha, their Lakshana, Bheda, Chikitsa and Sadhyasadyata (contemporary and classical views).
- Enlist the names of Acids and Alkalies poisons and describe in detail regarding Fatal Dose, Fatal period, Manifestation, management, medico legal importance and postmortem appearance of poisoning due to Sulphuric Acid Poisoning.
- Enlist the names of Acids and Alkalies poisons and describe in detail regarding Fatal Dose, Fatal period, Manifestation, management, medico legal importance and postmortem appearance of poisoning due to Carbolic Acid Poisoning.
- Enlist the names of Non metallic poisons and describe in detail regarding Fatal Dose, Fatal period, Manifestation, management, medico legal importance and postmortem appearance of poisoning due to Copper Poisoning.
- Enlist the names of Asphyxiants and describe in detail regarding Fatal Dose, Fatal period, Manifestation, management, medico legal importance and postmortem appearance of poisoning due to Hydrogen Sulphide Poisoning.
- What is Madya and Madatyaya, write in detail about the stages and treatment of Alcohol- both classical and contemporary views.
- Give derivation, definition of Visha and Agad Tantra and explain the difference between Garavisha and Dushivisha with examples.
- Define Agad Tantra and explain in detail what is the scope of Agad Tantra in 21st Century.
- Describe Veganusara lakshanas and chikitsa of Sthavara Visha.
- Explain Ahiphena-its fatal Dose, fatal period, management of poisoning, post mortem appearance and its medico legal importance.
- Explain Bhanga-its fatal Dose, fatal period, management of poisoning, post mortem appearance and its medico legal importance.
- Explain Snuhi-its fatal Dose, fatal period, management of poisoning, post mortem appearance and its medico legal importance.
- Explain Jayapala-its fatal Dose, fatal period, management of poisoning, post mortem appearance and its medico legal importance.
- Explain Eranda-its fatal Dose, fatal period, management of poisoning, post mortem appearance and its medico legal importance.

- Explain Cerebra odallam-its fatal Dose, fatal period, management of poisoning, post mortem appearance and its medico legal importance.
- What is Ashtavidha Tamtra Doshas, therapeutic, fatal dosages, signs and symptoms along with treatment of Tamra Visha.
- Define the term Toxicology and write in detail about the Diagnosis of poison in Dead and in Living.
- What are the factors that reduce the potency of snake venom.
- Classify Visha and write about Gara visha and its management in Detail.
- Describe the properties of Visha and explain how they cause suffering.
- Explain Charakokta Chaturvimshati Upkrama, and explain the treatment protocol for unabsorbed poisoning.

Short Essay

- what is cadaveric spam . described its medico legal importance.
- How will you do lavage?
- Described dooshi visha & discuss its role in present scenario
- What are the indications for justifiable abortions
- What is the universal antidote? How does each ingredient work?
- What are treatment measures to be adopted in the 3rd & 5th visha vegas of mandali sarpa?
- Give details of asadhya laxanas of moosika visha
- Enlist the signs & symptoms of chronic arsenic poisoning
- What are 'dangerous injuries'
- Describe the management of gara visha
- Madatyaya
- Mandali sarpa toxic signs symptoms & its management
- Mercury poisonous symptoms & its management

- Dhooshi visha
- Vruschika visha
- Explain what is Vishopkramas.
- Write a short note on: Shanka Visha.
- Explain what is Sankata Visha.
- Loota Visha Chikitsa.
- Write the difference between Visha Vega and Visha Veganatara.
- What are the Sthavara Visha Adhisthanas? Give examples.
- What is Dushi Visha? Explain its causes, symptoms and treatment.
- Explain the differentiation of a case of Arsenic poisoning from Cholera.
- What is an antidote? Give the classification of antidotes.
- Give the symptoms and treatment of Alarka Visha.
- What are the different types of Sarpa Damsha?
- Which is the disease that stimulates strychnine poisoning? How would you differentiate the two?
- Routes of administration of poisons in modern
- Scorpion Bite- Ayurvedic treatment.
- Duties of medical practitioner in case of suspected poisoning.
- Difference between Antidote and Substitute with examples.
- General treatment principles of poisoning according to modern.
- Write a short note on: Cerebral poisons with examples and antidotes.
- Write a short note on: Cardiac poisons with examples and antidotes.
- Write a short note on: Irritant poisons with examples and antidotes.
- Write a short note on: Corrosive poisons with examples and antidotes.
- Write a short note on: Asphyxial poisons with examples and antidotes.
- Write Methyl alcohol poisoning symptoms.

- Definition and importance of Visha Vegas.
- Write a short note on: Rakta Mokshan (Blood letting).
- Write a short note on: Arishta Bandhan (Tourniquet).
- Unabsorbed poison treatment according to modern.
- Write about Antidotes with examples?
- Write a short note on: Mercury Poisoning.
- Write a short note on: Alcohol Poisoning.
- Autopsy-external examination
- documentary evidence
- Coma-causes, post mortem appearances
- Post mortem lividity
- Hydrostatics test
- Putrefaction
- Mummification
- Abortion
- Vishotkarshaka hetu
- Fire arm wounds
- Visha mukta laxanas
- Haratala
- Rape
- What are 'dangerous injuries'?
- Describe the management of gara visha
- Signs of poison mixed food
- Pashu vishaktata (animal poisoning)
- Sthawara visha
- Alarka visha
- What are the symptoms of Gunja Poisoning.
- Describe the symptoms and treatment of Gara Visha?
- Define Vega. What are the sthavara Visha Vegas?
- Describe the symptoms and treatment of Vrischika Visha.
- Describe the signs and symptoms of Arsenic poisoning.
- What is the classification of Sarpa? Explain their relation to tridoshas.
- Describe the classification of poisons.
- Explain the darvikara visha vega lakshanas.
- Describe the action of Visha on human body according to Sushruta.
- What is Dushi Visha? What are the conditions that aggravate dushi visha.
- What is Jala santrasa? Describe the treatment for Alarka Visha.
- Write a short note on: Types of Visha.
- Write the lakshanas of Vishadata.
- What are madatyaya awasthas and their signs.
- Describe Mandali Sarpa Visha Chikitsa.
- Differentiate between Loota visha and Mushika Visha
- What are Upavishas and what are their fatal doses?
- Write about organic irritant poison with an example.
- What is Adharma and its role in the cause of disease.
- What are the gunas and karmas of Visha.
- Write the symptoms of lead poisoning with its management.
- Explain jangam adhisthana with examples.
- Write a short note on: Gara visha.
- Write a short note on: Copper poisoning.
- Write a short note on: Dushi visha.
- Write a short note on: Bhallataka
- Write a short note on: Vishakanya
- Write a short note on: Kupilu
- Write a short note on: Pranacharya (The royal physician)
- Difference in poisoning caused by Sulphuric acid and Hydrochloric acid.
- Write a short note on: Visha pareeksha according to Sushruta.
- Write a short note on: Visha Vegas with reference to "Dhatu Vaigunya"
- Write a short note on: Mercury poisoning and its management.
- Write a short note on: Deliriant Poisons.

- Write a short note on: Alkali Poisons.
- Write a short note on: Signs of Poisons.
- Write a short note on: Sarpa visha
- Write a short note on: Carbolic acid poisoning symptoms.
- Write a short note on: Madatyaya bhedas.
- Write a short note on: Sulphuric acid poisoning symptoms.
- Write a short note on: Viruddhahara.
- Write in brief on Shanka Visham.
- Write a short note on: Khanija visha
- Write symptoms and treatment of Vanga Visha.
- Write in brief on: Acute Arsenic Poisoning.
- Write down the Antidotes and Treatment of Bhallataka.
- Write down the Antidotes and Treatment of Vatsanabha.
- Write down the Antidotes and Treatment of Kalihari.
- Write down the Antidotes and Treatment of Ashwamara.
- What is Environmental Toxicology?
- Define Toxicology, with modern classification of Poison?
- Define Achushan Upkrama (Treatment Modality)?
- What is difference between Visha, Madya and Oja Guna?
- Write about Visha Utpatti?
- Write short note on : Kshobaka Visha (Irritant Poison)
- Write a short note on: - Route of administration of Poison?
- Define Arishta Bandhan (Tourniquet)?
- Write the difference between Garavisha and Dooshivisha with examples?
- Write about Antidotes?
- Define Agad Tantra and compare Agad Tantra with Toxicology.
- Write a short note on: Kritrima Visha prevalent now a days.

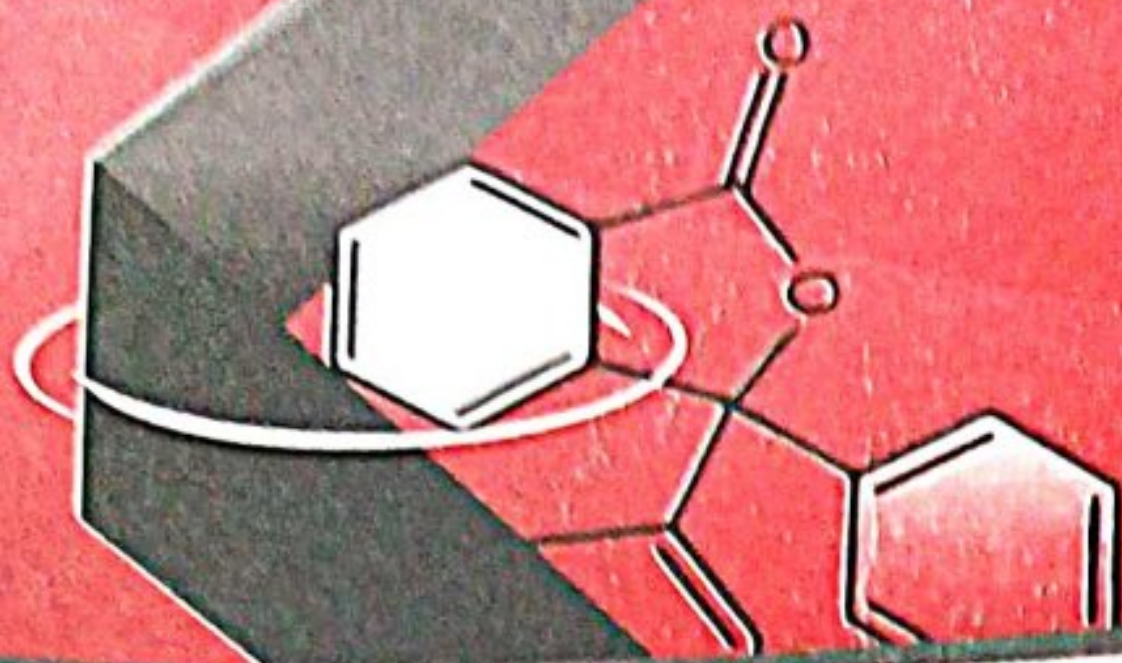
- What are the similarities between Madya and Visha?
- Write a brief note on the management of Food Poisoning.
- Write a short note on: Mantra in Visha Chikitsa
- Describe Hridyavaranam and drugs for it.
- Name any five Upavishas and write their fatal doses.
- Describe what is Universal Antidote.
- Write a short note on: general line of treatment in case of acute poisoning.
- Describe any two Cerebral poisons.
- Describe any two Cardiac poisons.
- Describe any two Irritant poisons.
- Describe any two Asphyxial poisons.
- Dactylography
- Brain stem death
- Privileges & rights of the patients
- Condition affecting the rate of putrefaction
- Forensic ballistics
- Routes of administration of poison
- Bhallataka poisoning
- Visha mukta laxanas
- Visha utkarshaka hetu
- Suicidal & homicidal poisoning
- Clinical symptoms of acid poisoning & its treatment
- Upavishas
- Chaturvimshati upakarmas
- Types of sarpa damsa
- Fatal dose & fatal period & treatment of dhatura
- Lootha damsa laxanas & treatment
- Visha bala (potency of poison)
- Symptoms & treatment in sunstroke
- Classification of burns
- Rajikara sarpa visha laxanas & treatment
- Gunja visha laxanas, fatal dose & treatment
- Changes after death
- Visha sankata

- Visha kanya
- Visha vega & vegantara
- Visha chikitsa upakarma
- Gara visha
- Darveekara
- Caustic soda
- Bhanga
- Rules for giving evidence
- Kupeelu
- Vandhyatwa karnani
- Difference between hanging & strangulation
- Pichchita vrana
- Stomach wash
- Vishakta bhojana pareekshanam
- Diagnosis of poisoning
- Oxalic acid
- Ahiphena
- Chikitsakasya pramanpatram
- Unmad laxanas
- Napumsakata karnani
- Asphyxia
- Gunshot injuries
- Toxic effects, Fatal dose & fatal period & treatment of bhallataka
- Degree of burns
- Conditions of alpavishntwa of snakes
- Vrushchika visha
- Vastsanabha
- External & internal features of starvation death
- Chaturvimshati upakarmas by charak
- Causes of visha vrudhi
- Lutha visha laxanas & chikitsa
- Medico-legal importance of age
- Visha tinduka
- Madatyaya
- Moosika visha
- Sulphuric acid
- Vastanabha
- Vyavahara ayurveda
- Gara visha
- Sodomi
- Coma
- Vidyut daha
- Lootha visha
- Physical antidote
- Vishadaata laxanas
- Arsenic poisoning
- Visha adhishtanas
- Abortion
- Late signs of death
- Drowning
- Abrasion
- Difference between police inquest & magistrate's inquest
- Mercury poisoning
- Difference between visha & ojas
- Chemical antidote
- Visha kanya
- Arsenic poisoning
- Age-medico legal importance
- Burns
- Tattoo
- Hanging
- Dactylography
- Who is expert witness? give examples.
- Explain rigor mortis?
- Enlist the names of spinal poisons and describe in detail any one of them.
- Enlist the names of cardiac poisons and describe in detail any one of them.
- Enlist the names of irritant poisons and describe in detail any one of them.
- Enlist the names of corrosive poisons and describe in detail any one of them.
- Enlist the names of cerebral poisons and describe in detail any one of them.
- Enlist the names of asphyxial poisons and describe in detail any one of them.
- Describe Virruddhahara and explain the

classification, diagnosis and treatment of Food adulteration.

- Explain Upavishas and write in detail about the Gunja Visha.
- Explain Upavishas and write in detail about the Dhatura Visha.
- Explain Upavishas and write in detail about the Kupilu Visha.
- Explain Upavishas and write in detail about the Bhallataka Visha.

- Explain Upavishas and write in detail about the Langali Visha.
- Explain Upavishas and write in detail about the Arka Visha.
- Explain Upavishas and write in detail about the Belladonna.
- Explain Upavishas and write in detail about the Digitalis
- Write difference between Visha Guna and Oja Guna?
- Write a short note on: Matarviruddha



Important MCQ

- Tobacco is...poison.
 - Corrosive
 - Somniferous
 - Cardiac
 - Spinal
- Which of the following is a spinal stimulant poison?
 - Ahifen
 - Kuchala
 - Vatsanabh
 - Arka
- Which of the following Dravya is not used for Hrudayavaran?
 - Gomay rasa
 - Kshaudra
 - SupakwaEkshu
 - Mudgayusha
- In Visha Chikitsa, Kakandadiyoga is indicated for.....Chikitsa.
 - Vamana
 - Virechana
 - Mrutasanjivana
 - Upadhana
- According to Sharangadhara, Visha Guna are in number

A) 8	B) 10
C) 7	D) 9
- According to Sushruta, Moola Visha are Ö. in number.

A) 7	B) 9
C) 6	D) 8
- Daha Upakrama is indicated forÖÖ Visha.

A) Twakgata	B) Mamsagata
C) Takmamsagata	D) Raktagata
- Shodhanchikitsa protocol for Dooshivisha is.....
 - Snehana,- swedana- vamanvirechana
 - Snehana- swedana- vaman
 - Snehana,- vamana- virechana
 - Swedana- vamana- Virechana
- According to Sushruta, Avapeedachikitsa is given in.....vega of sthavaravisha.
 - third
 - seventh
 - fifth
 - fourth
-is the active principle present in Jaypal.

A) Croton	B) Abrin
C) Ricin	D) Calotoxin
- Which of the following is a plant irritant poison?

A) Dhatura	B) Bhanga
C) Jaypal	D) Karveer
- Which of the following drug is mentioned in Charakokta Vishghna Mahakashaya?

A) Amruta	B) Suvaha
C) Klitak	D) Apamarga
- According to Gangadhar Teeka, the sthavarvishagati is.....

A) Tiryak	B) Sarvag
C) Urdhwa	D) Adho
- According to Charaka,..... is one of the hetu of shotha.

A) Gunja	B) Bhallataka
C) Jaypal	D) Arka
- Arushkara is the synonym of.....upavisha.

A) Gunja	B) Bhallatak
C) Jaypal	D) Snuhi

16. Anaphylaxis reaction may occur with the consumption of..... visha.
A) Arka B) Snuhi
C) Bhallatak D) Dhatura
17. Which of the following is not the toxicity feature of dhatura?
A) Dermatitis B) Dysphagia
C) Mydriasis D) Dysurea
18. According to Sushrut, types of Loota are-
A) 10 B) 12
C) 14 D) 16
19. According to Sushrut, How many types of Loota Visha are Sadhya and Asadhya?
A) 10 Sadhya, 6 Asadhya
B) 8 Sadhya, 8 Asadhya
C) 9 Sadhya, 7 Asadhya
D) 12 Sadhya, 4 Asadhya
20. How many types of DushivishaMooshak are there according to Charak?
A) 10 B) 14
C) 18 D) 20
21. Visha Adhisthan of Mooshaka is-
A) Shukra B) Lala
C) Nakha D) Danta
22. How many types of Manduka are considered by Acharya Sushrut?
A) 2 B) 4
C) 6 D) 8
23. Which of the following is not the symptom of SavishaJalauka Dansha according to Charak?
A) Kandu B) Shotha
C) Jwara D) Pipasa
24. According to Sushrut, How many types of Mashak are there?
A) 3 B) 7
C) 10 D) 5
25. Types of Makshika according to Sushrut-
A) 5 B) 6
C) 7 D) 8
26. Which Makshika dansha is regarded as Pranahar according to Charak?
A) Sthagika B) Kantarika
C) Pingala D) Krushna
27.this upavisha is used as an ecboic for criminal abortion.
A) Dhatura
B) Jaypal
C) Kuchala
D) Eranda
28. is upavisha used for criminal abortion through inducing general toxicity to body.
A) Strychnine
B) Dhaturametel
C) croton tiglium
D) Calatropis
29. is upavisha used for criminal abortion through reflex uterine stimulant.
A) Strychnine
B) Dhaturametel
C) Abrus precatorius
D) croton tiglium
30. The action of Croton oil to induce criminal abortion is.....
A) Ecboics
B) Reflex uterine stimulant.
C) Genito-urinary irritant
D) Emmenagogues
31. Plumbago acts as a..... to induce criminal abortion.
A) Primarily toxic to other systems.
B) Genito-urinary irritant
C) Emmenagogues
D) Ecboics
32. this upvisha is used for criminal abortion.
A) Aconite
B) Abrus precatorius
C) Nerium odorum
D) Dhaturametel

33. this upvisha is used as a reflex uterine stimulant for criminal abortion
 A) Oil of Eranda
 B) Oil of tansy
 C) Oil of turpentine
 D) Oil of jaypal
34. Dais use upavisha for the preparation of abortion stick.
 A) Karvira
 B) Kuchala
 C) Dhatur
 D) Eranda
35. Usually juice of ——— is applied on abortion stick
 A) Ekshu
 B) Ulmus fulva
 C) Bhallatak
 D) Snuhi
36. Usually ——— stick is used as an abortion stick in India.
 A) Chitrak
 B) Mango
 C) Bamboo
 D) Papaya
37. Which is not the Post Mortem appearance in case of Hydrocarbons poisoning?
 A) Acute Gastroenteritis
 B) Pulmonary Oedema
 C) Hypoplasia of Bone marrow
 D) Chalky white appearance of gastric mucosa
38. Intravenous injection of Kerosene will produce-
 A) Cyanosis B) Pulmonary edema
 C) Both A and B D) None
39. Emesis is indicated in the treatment of which poisons?
 A) Gasoline B) Benzene
 C) Kerosene D) None
40. Napthalene is used in-
 A) Pesticide industry
 B) Insulating material on electric wires
 C) Dye industry
 D) All
41. Napthalene is classified as-
 A) Irritant poison
 B) Somniferous
 C) Household Poison
 D) Both A and C
42. Which symptom is seen in initial stage of Napthalene ingestion?
 A) Hemolytic crisis
 B) Pallor
 C) Strangury
 D) Mild Jaundice
43. According to Charak, lepa of Shirish flowers and SnuhiksheerA is used on-
 A) Vrushchika Visha
 B) Alarka Visha
 C) Dardur Visha
 D) Krukantak Visha
44. According to Charak, Dushivishakeeta-dashtalaskhana is-
 A) Kandū
 B) Daha
 C) Visarpa
 D) All
45. According to Vagbhat, How many Visha AdhishthanA are there in Loota (Spider)?
 A) 6 B) 7
 C) 8 D) 9
46. According to Charaka, Visha Vega in human are.....in number.
 A) 7 B) 4
 C) 8 D) 10
47. Sushruta advised consumption of Ajeya Ghruta for.....
 A) Virechana B) Hrudayavarana
 C) Nasya D) Pratisaran

48. Which of the following mantra is uttered for Visha Chikitsa ?

- A) Gayatri Mantra
- B) Vishnu Sahatranam
- C) Ram Raksha
- D) NilkanthaTrayakshari

49. According to Charak, Yoni of Visha is.....

- A) Ras
- B) Tej
- C) Ambu
- D) Pruthvi

50. According to Sushruta, SthavaraVisha Adhishtana are in number.

- A) 16
- B) 10
- C) 8
- D) 13

51. According to Sushruta, Jangam Visha Adhishtana are in number.

- A) 10
- B) 12
- C) 16
- D) 14

52. is one of the ingredients of Dooshivishari Agada.

- A) Mamsi
- B) Amruta
- C) Shunthi
- D) Triphala

53. Which of the following yog is used for the treatment of GaropahatPawak?

- A) Dooshivishari
- B) Moorvadi
- C) Eladi
- D) Panchashirisha

54. According to Sushruta, which of the following is one of the Upadrava of Dooshivisha?

- A) Jwara
- B) Pandu
- C) Kotha
- D) Shwas

55. is the toxic principle present in Vatsanabha.

- A) Usharin
- B) Aconitine
- C) Nerin
- D) Calotropin

56. Hippus sign is characterized by.....

- A) pin point pupils
- B) dilated pupils
- C) alternate contraction and dilatation of pupils
- D) semi dilated pupils

57. Inj. Atropine is mainly used as antidote in acute poisoning of.....

- A) Bhanga
- B) Vatsanabh
- C) Dhatura
- D) Kuchala

58. The features of Gunja poisoning resemble with poisoning.

- A) cobra snake bite
- B) viper snake bite
- C) krait snake bite
- D) Phosphorus

59. The principal toxicological action of abrin is.....

- A) Metabolic enzyme deactivation
- B) protein synthesis inhibition
- C) Disruption of signal transduction in neurons
- D) Hb synthesis disruption

60. Which of the following Visha Dravya are the ingredients of Sanjeevani Vati?

- A) Bhallatak and Dhatura
- B) Dhatura and Vatsanabh
- C) Bhallatak and Vatsanabh
- D) Kuchala and Vatsanabh

61. Which of the following bhavana Dravya is used for Shodhana of Afu?

- A) Godugdha
- B) Gomutra
- C) Aardrak Swarasa
- D) BabbulTwakKwatha

61. According to Charak, Visha Visarpantakes place in the body inÖÖÖ..

- A) Sharad
- B) Vasant
- C) Varsha
- D) Shishir

62. According to Vagbhata, Sarpa Dansha Bheda are.....in number.

- A) 2
- B) 3
- C) 3
- D) 5

63. According to Sushruta, Sarpa Bheda are.....
 A) 80 B) 60
 C) 70 D) 50
64. According to Sushruta, Sankhya of Nirvisha Sarpa is.....
 A) 10 B) 12
 C) 22 D) 26
65. Sarvakarmika agada is indicated in.....Visha.
 A) Loota
 B) Sarpa
 C) Vruschika
 D) Kita
66. Meghanad agada is indicated inSarpa Damsha.
 A) Darvikar
 B) Rajiman
 C) Vaikaranj
 D) Mandali
67. Risus sardonicus is a feature seen in poisoning.
 A) Vatsanabh
 B) Dhatura
 C) Kuchala
 D) Karveer
68. Pleurosthotonus is..... of the body.
 A) Forward bending
 B) backward bending
 C) lateral bending
 D) straight stiffening
69. Which of the following is the antidote of Kuchala?
 A) Atropine
 B) Naloxone
 C) Prostigmine
 D) Barbiturates
70. The usual fatal dose of Vatsanabha rhizome powder is.....
 A) 10 mg B) 100 mg
 C) 1 gm D) 1mg
71. is the English name of Vatsanabha.
 A) Jimson seed
 B) Wolf's bane
 C) Tiger's claws
 D) Swallow wart
72. The differential diagnosis for Kuchala poisoning is with.....
 A) acute gastroenteritis
 B) tetanus
 C) gullienbarrie Syndrome
 D) ventricular tachycardia
73. Which of the following is not an abuse preparation of Bhanga?
 A) Charas B) Ganja
 C) Marijuana D) Afim
74. Which of the following active principle is responsible for psychoactive effects of Bhanga?
 A) Tetrahydrocannabinol
 B) Hyoscyamine
 C) Pseudoaconitine
 D) Epinephrine
75. Inj. Methadone is used as drug of choice in the treatment of.....
 A) Dhaturapoinsoning
 B) Morphinism
 C) Hashish insanity
 D) Plumbism
76. Clothes of corpse gives inference about-
 A) Occupation
 B) Religion
 C) Ethnicity
 D) All
77. How many types of scorpions are present in India?
 A) 98 B) 99
 C) 100 D) 101
78. Visha Prasarain Alarka Visha is due to-
 A) Lalastrava B) Raktastrava
 C) Dansha D) Shukrastrav

79. Visha Adhishthana in Alarka Visha is-
- Lalastrava
 - Tundasthi
 - Nakha
 - Sweda
80. Which is not the sthanikalakshana of Unmata Chatuspad Damsha?
- Trushna
 - Supti
 - Kleda
 - Vikunchanam
81. Exhumation is very rare in-
- India
 - Scotland
 - France
 - Germany
82. Objectives of Exhumation are-
- Identification
 - Second Autopsy
 - Establishing cause of death
 - All
83. Dhatura has been used as Ö..poison.
- abortifacient
 - Somniferous
 - stupefying
 - Sui
84. The antidote used in the treatment of Dhatura poisoning isÖ..
- Physostigmine
 - Atropine
 - Coramine
 - Phenobarbitone
85. Fatal dose of Dhaturaseeds isÖÖÖ.
- 1-2
 - 10-20
 - 50-100
 - 500-600
86. Which of the following is used as sui poison?
- Dhatura
 - Gunja
 - Arka
 - Karveera
87. How many types of Vruschika are mentioned by Sushruta?
- 2
 - 3
 - 4
 - 5
88. In case of Manda Visha Vruschika which oil is used for Sechan?
- Veertarvadi Gana siddha Taila
 - Asanadi Gana siddha Taila
 - Vidaryadi Gana siddha Taila
 - Vishagna siddha Taila
89. Visha Adhishthana in Vrushcika is-
- Danta
 - Aar
 - Drushti
 - Lala
90. Examination of the dead body is carried out in-
- Ultra violet light
 - Moonlight
 - Commercial lamps
 - Natural light
91. Rabies virus has neurotropism to-
- GABA receptors
 - Acetylcholine
 - Serotonin
 - All
92. Fatal Dose of Kerosene on ingestion is-
- 10 ml
 - 50ml
 - 2 ml
 - 20ml
93. Maximum allowable concentration of Kerosene in air is-
- 100 ppm
 - 500 ppm
 - 800 ppm
 - 1000 ppm
94. Specific feature appearing on ingestion of Benzene and Toluene is-
- Vomiting
 - Diarrohoea
 - Haemetemesis
 - Colicky pain
95. In case of Hydrocarbons toxicity, Bronchospasm occurs when
- Poison enters the URT
 - Poison enters LRT
 - Poison is in Nasopharynx
 - Poison enters oesophagus

96. In Hydrocarbon toxicity, CNS depression occurs due to-
- CNS Toxicity
 - Pulmonary Toxicity
 - GI Toxicity
 - Systemic Toxicity
97. According to Charak, Sheetopachara is not done in which 2 Visha Badha-
- Rajimant Sarpa and Vrushchika
 - Vrushchika and Uchchitinga
 - Vrushchika and Jalauka
 - Jalauka and Matsya
98. Panchakapithaghrut destroys the poisons of-
- All types of Vruschika
 - All types of Mooshak
 - All types of Matsya Visha
 - All types of Jalauka
99. According to Sushrut, which poison if left untreated becomes similar to Dushivisha?
- Matsya
 - Keeta
 - Jalauka
 - Mooshak
100. While biting, Formic acid is secreted by-
- Rats
 - Fish
 - Leech
 - Ants

Answers of MCQ

1. C	2. B	3. D	4. C	5. A
6. D	7. C	8. D	9. B	10. A
11. C	12. B	13. D	14. B	15. B
16. C	17. A	18. D	19. B	20. C
21. A	22. D	23. D	24. D	25. B
26. A	27. C	28. D	29. C	30. B
31. A	32. B	33. A	34. A	35. C
36. A	37. D	38. C	39. D	40. D
41. D	42. C	43. C	44. D	45. C
46. C	47. B	48. D	49. C	50. B
51. C	52. A	53. B	54. A	55. B
56. C	57. B	58. B	59. B	60. C
61. C	62. C	63. A	64. B	65. A
66. A	67. C	68. C	69. D	70. C
71. B	72. B	73. D	74. A	75. B
76. D	77. B	78. C	79. A	80. A
81. A	82. D	83. C	84. A	85. C
86. B	87. B	88. C	89. B	90. D
91. D	92. A	93. B	94. C	95. B
96. B	97. B	98. B	99. D	100. A

Important MCQ

1. Which of the following disorder is the result of chronic mercury poisoning?
 - A. Black foot disease
 - B. Menke's Kinky hair syndrome
 - C. Pink's disease
 - D. Wilson's disease
2.is a protoplasmic poison.
 - A. Iodine
 - B. Copper
 - C. Arsenic
 - D. Phosphorus
3. In postmortem findings,.....smell of the stomach contents emanates in arsenic poisoning.
 - A. Kerosene
 - B. Garlic
 - C. No
 - D. Sweet
4. is a autosomal recessive disorder having error of copper metabolism.
 - A. Klienfilter's syndrome
 - B. Dawn's syndrome
 - C. Wilson's disease
 - D. Pot's disease
5. Which of the following disorder is the result of chronic mercury poisoning?
 - A. Black foot disease
 - B. Menke's Kinky hair syndrome
 - C. Pink's disease
 - D. Wilson's disease
6. Constipation and offensive stool are the characteristics in acute.....poisoning
 - A. Lead
 - B. Mercury
 - C. Arsenic
 - D. Copper
7. Section 375 IPC deals with....
 - A. Rape
 - B. Grievous hurt
 - C. Murder
 - D. Sodomy

8. Valid consent for sexual intercourse can be given by a female above the age of.....years.
 - A. 12
 - B. 15
 - C. 16
 - D. 18
9. Sodomy is punishable under section.....IPC.
 - A. 354
 - B. 375
 - C. 377
 - D. 378
10. Disulfiram is useful independence
 - A. Alcohol
 - B. Heroin
 - C. Cocaine
 - D. Cannabis
11. Optic atrophy is seen inpoisoning
 - A. Lead
 - B. Phosphorus
 - C. Methyl alcohol
 - D. Ethyl alcohol
12. Maximum ethyl alcohol content is seen in.....
 - A. Rum
 - B. Brandy
 - C. Whisky
 - D. Gin
13. Skin blisters are not seen in case of...
 - A. Barbiturate poisoning
 - B. Electric shock
 - C. CO poisoning
 - D. Decomposition
14. The drug of choice in organophosphate poisoning is....
 - A. Atropine
 - B. BAL
 - C. EDTA
 - D. Copper sulphate
15. Most common death due to suicide is by
 - A. Phenobarbitone
 - B. Insecticides
 - C. Hanging
 - D. Suicidal cut throat
16. Which one of the following insecticide is an organophosphorus compound?
 - A. Endrin
 - B. DDT
 - C. BHC
 - D. Malathion

17. Kerosene like smell from mouth is present in.....poisoning.
A. Mercury
B. Arsenic
C. Organophosphorus
D. Phosphorus
18. The fatal dose of methyl alcohol is.....
A. 20-40ml
B. 40-50ml
C. 60-200ml
D. 200-300ml
19. A person after ingesting a toxic agent is in a state of Narcosis. The pupils are constricted. However, on pinching the neck the pupils dilate initially and slowly return to their original size. The toxic agent is:
A. Barbiturate
B. Alcohol
C. Strychnine Organophosphate
D. Carbolic acid
20. Blackout is due to:
A. Alcohol intoxication
B. Cocaine toxicity
C. LSD toxicity
D. Cyanide poisoning
21. Korsakoff's psychosis is seen in
A. CRF
B. Chronic alcoholism
C. Marasmus
D. Cirrhosis
22. CAGE questionnaire is used in:
A. Alcohol dependence
B. Opiate poisoning
C. Dhatura poisoning
D. Barbiturate poisonin
23. In India, driving under influence is considered at blood alcohol level of:
A. ≥ 20 mg% B. ≥ 30 mg%
C. ≥ 50 mg% D. ≥ 100 mg%
24. The dead body is lying on autopsy table. There is leathery, fine, tenacious, froth at mouth and nostrils. The death is due to:
A. Opium poisoning
B. Barbiturate poisoning
C. Throttling
D. Drowning
25. Widmark's formula is used for measurement of blood levels of:
A. Benzodiazepines
B. Barbiturates
C. Alcohol
D. Cocaine
26. A 5-year-old child presents with confusion, increased salivation, fasciculations, miosis, tachycardia and hypertension. Poison that can cause these manifestations:
A. Opium B. OPC
C. Dhatura D. Arsenic
27. A lady died due to unnatural death within seven years of her marriage. The inquest in this case will be done by:
A. Forensic medicine expert
B. Deputy superintendent of police
C. Sub-divisional magistrate
D. Coroner
28. When a doctor issues a false medical certificate, then he is liable under:
A. Sec. 197 IPC
B. Sec. 87 IPC
C. Sec. 304A IPC
D. Sec. 338 IPC
29. A married woman died in unnatural conditions within 5 years of her marriage. Her parents complained of frequent demand of dowry. Her autopsy will be conducted under which section:
A. Sec. 174 CrPC
B. Sec. 176 CrPC
C. Sec. 302 IPC
D. Sec. 304B IPC

Important MCQ

30. Color of urine in phenol poisoning:
 A. Red
 B. Green
 C. Yellow
 D. Blue
31. Maximum damage to esophagus is with:
 A. H_2SO_4
 B. Sodium hydroxide
 C. Acetic acid
 D. Nitric acid
32. In postmortem findings, leathery stomach is seen in poisoning with:
 A. HCl
 B. H_2SO_4
 C. Carbolic acid
 D. Oxalic acid
33. Antidote for mineral acid poisoning is:
 A. $MgSO_4$
 B. $CuSO_4$
 C. $NaHCO_3$
 D. MgO
34. Color that can be observed in nitric acid toxicity is
 A. White
 B. Black
 C. Yellow
 D. Red
35. In acute cyanide poisoning, amyl nitrate is given by one of the following route:
 A. Oral
 B. Intravenous
 C. Inhalation
 D. Intramuscular
36. Which one of the following is the feature of Sulphuric acid poisoning?
 A. Dark tongue with yellowish teeth
 B. Blackish tongue with chalky white teeth
 C. Bluish line at the junction of the teeth and the gums
 D. Sequestration and necrosis of the jaw
37. During post mortem exam odour of bitter almond is found in case of.....poisoning.
 A. Hydrocyanic acid
 B. Nitric acid
 C. Acetic acid
 D. Carbolic acid
38. Ophotoxemia refers to
 A. Organophosphorous poisoning
 B. Heavy metal poisoning
 C. Scorpion venom poisoning
 D. Snake venom poisoning
39. The most useful bedside test to suggest snake bite envenomation is
 A. Prothrombin time
 B. 20 min whole blood clotting time
 C. International normalized ratio
 D. Platelet count
40. Viper venom causes
 A. Acute renal failure
 B. Dysphagia
 C. Nerve paralysis
 D. Polycythemia
41. Haematuria may occur in bite of
 A. Krait
 B. Cobra
 C. Viper
 D. Sea snake
42. A girl, otherwise healthy, sleeping on the floor suddenly develops nausea, vomiting, abdominal pain, quadriplegia at night. Diagnosis is:
 A. Guillain Barre syndrome
 B. Krait bite
 C. Poliomyelitis
 D. Periodic paralysis
43. Muscle paralysis is caused by bite of:
 A. Sea snake
 B. Krait
 C. Mamba
 D. Python
44. IPC section dealing with dowry death:
 A. 307 IPC
 B. 304 IPC
 C. 304 A IPC
 D. 304 B IPC
45. Incised wounds on genitalia:
 A. Homicidal
 B. Suicidal
 C. Accidental
 D. Self-inflicted

46. Black gunpowder contains all of the following, except:
- Potassium nitrate
 - Lead peroxide
 - Charcoal
 - Sulphur
47. A dead body is found to have marks like branching of a tree on front of the chest. Most likely cause of death could be:
- Firearm injury
 - Lightning injury
 - Road traffic accident
 - Bomb blast injury
48.is upavisha used for criminal abortion through reflex uterine stimulant.
- Strychnine
 - Dhaturametel
 - Abrus precatorius
 - croton tiglium
49. The action of Croton oil to induce criminal abortion is.....
- Ecbolics
 - Reflex uterine stimulant.
 - Genito-urinary irritant
 - Emmenagogues
50.this upvisha is used as a reflex uterine stimulant for criminal abortion
- Oil of Eranda
 - Oil of tansy
 - Oil of turpentine
 - Oil of jaypal
51. Following is not the ground of abortion under MTP Act.....
- Therapeutic ground
 - Eugenic ground
 - Humanitarian ground
 - unwanted pregnancy
52. Permission of is necessary for legal termination of pregnancy from 12 to 20 weeks.
- 1st class magistrate
 - Civil surgeon
 - two medical officers
 - Panel of five medical officers
53. The most effective method recommended by WHO to carry MTP in 1st trimester is.....
- Antiprogesterones
 - Combination of prostaglandin & antiprogesterones
 - Prostaglandin
 - Langali mool
54. Cupping method is used for.....
- Induction of criminal abortion
 - Diagnosis of pregnancy
 - Diagnosis of sterility
 - Treatment of hemorrhage
55. In PM examination of criminal abortion if cause of death is..... pre-autopsy radiology of chest and abdomen is recommended.
- Heamorrhage
 - Air embolism
 - vagal inhibition
 - Sepsis
56. Presence of..... under microscope in the cells of placental site is sure sign of pregnancy.
- Chorionic villi
 - Enlarged endometrium
 - Red blood cells
 - Pus cells
57. Atweek gallbladder of foetus contain bile.
- 24th week
 - 22th week
 - 20th week
 - 28th week
58. Flouting of lung pieces even after removal of tidal air by squeezing, indicative of.....
- Still birth
 - Live birth
 - Dead born
 - Premature birth
59.appearance is a specific sign of respired lung in PM finding of suspected case of infanticide.
- Uniform reddish-brown
 - Rosy coloured
 - Mottled
 - Spongy

60. The loss of alignment and over-riding of cranial bones is called as.....
 A. Spalding sign
 B. Chandwich sign
 C. Hegar's sign
 D. Ploucquet's sign
61. The important evidence of attainment of maturity in foetus is presence of ossification center in the.....
 A. Lower end of humerus
 B. Lower end of femur
 C. Upper end of humerus
 D. Upper end of femur
62. Hydrostatic test is recommended in presence of.....
 A. Signs of intrauterine maceration
 B. Separated umbilical sign with cicatrisation of umbilicus
 C. Stomach contain milk
 D. Evidence of oedema of lungs in histology
63.is not the legally accepted evidence of live birth
 A. Expanded lungs
 B. Cicatrisation of umbilicus
 C. Food in stomach
 D. Air in gastrointestinal tract
64. Sec 318 is related to ÖÖ
 A. Criminal abortion
 B. Grievous injury
 C. Dowry case
 D. Concealment of birth
65. The penalty for violation of PC&PNDT Act 1994 by RMP is proved for first offence is
 A. imprisonment for 3 yrs& fine upto 10,000
 B. Removal of name from register for 5 yrs
 C. Imprisonment for 3 yrs& fine upto 50,000/-
 D. Permanent removal of name from register
66.does not falls under the criteria of primary identification data.
 A. Age
 B. Sex
 C. Finger print
 D. Stature
67. Short upper and lower extremities are the characteristic of
 A. Indians
 B. Negroids
 C. Caucasians
 D. Mangoloids
68.bone is not useful in determination of sex
 A. Sacrum
 B. Mandible
 C. Sternum
 D. Clavicle
69. In Turner's syndrome the sex chromosomal pattern is.....
 A. XY
 B. XXY
 C. XX
 D. XO
70. A female with short structure, webbed neck & sterility is seen in.....
 A. Turner's syndrome
 B. Klinefelter's syndrome
 C. Gonadal agenesis
 D. pseudo hermaphrodites
71. In gonadal agenesis the pattern of sex chromosome is.....
 A. XY
 B. XXY
 C. XX
 D. 00
72. An anatomically male with XXY chromosome pattern is seen in.....
 A. Turner's syndrome
 B. Klinefelter's syndrome
 C. Gonadal agenesis
 D. Pseudo hermaphrodites
73. The germination of deciduous teeth starts in maxilla by.....
 A. 4th /5th intrauterine month
 B. 6th /7th extrauterine month
 C. 4th /5th extrauterine month
 D. 6th /7th intrauterine month

74. Other than age the teeth also helps to determine.....
A. Sex
B. Blood group
C. race
D. All
75.is most reliable long bone used to estimate age of a person
A. Femur B. Humerus
C. Skull D. Tibia
76. Inpoisoning the tissue gets poisoned leading to extracellular histotoxic anoxia
A. Chloroform
B. Halothane
C. Cyanide
D. Carbon dioxide
77. Death in house fire is mostly contributed to
A. Carbon dioxide poisoning
B. Burns
C. Carbon monoxide poisoning
D. Traumatic asphyxia
78. The typicalcolour in area of hypostasis is evident in carbon monoxide poisoning
A. cherry pink
B. Bluish purple
C. brownish black
D. Greenish
79. Foetus is more vulnerable to Carbon monoxide poisoning than adult because.....
A. Greater content of haemoglobin
B. lower partial pressure of oxygen
C. Tendency to cause greater tissue hypoxia
D. All
80. Bilateral necrosis of basal ganglia & globus pallidus are typically seen in delayed death from.....
A. CO poisoning
B. CO₂ poisoning
C. Drowning D. Hanging
81. Bruising in inner aspect of lips is a very important evidential finding in.....
A. Choking B. Smothering
C. Gagging D. Strangulation
82. The blockage of internal upper respiratory passage by liquid medium is called as
A. Smothering
B. Drowning
C. Mugging
D. Gagging
83. The method of homicidal smothering and traumatic asphyxia is renowned as.....
A. Lynching
B. Cafe coronary
C. Burking
D. Postural asphyxia
84. Pink colored Postmortem hypostasis is confined to head, neck and front of upper part of chest indicative of Ö.. as cause of death.
A. Drowning
B. Hanging
C. Traumatic asphyxia
D. Postural asphyxia
85. The assessment of difference of level of chloride in right and left side of heart is known as.....
A. Swann test
B. Hegar's test
C. Diatom test
D. Gettler's test
86. The chloride content of left side of heart in fresh water drowning is than right side of heart.
A. lower B. equal
C. higher D. 25% higher
87. Development of cutis anserina is a Post mortem finding seen in.....
A. Drowning B. Thermal injury
C. Burking D. Hanging

88. Contact flattening is reflection of
- Rigor mortis
 - Algor mortis
 - Primary relaxation
 - Livor mortis
89. The most frequently found pattern of figure print is.....
- Loop
 - Arch
 - Whorl
 - Composite
90. Study of measurement of various parts of human body is called as.....
- Bertillon system
 - Poroscopy
 - Galton system
 - Podogram
91. Withtechnique comparison of pores of two figure prints is studied.
- Dactylography
 - Birtillon's system
 - Poroscopy
 - Galton system
92. The raise in temperature after death is called as.....
- Algor mortis
 - Livor mortis
 - Postmortem caloricity
 - Rigor mortis
93.is the earliest sign of death.
- loss of ocular tension
 - Changes in retina
 - Taches Noire Scleroitiques
 - Haziness of cornea
94. The marked low blood pH can be detected during stage of.....
- Primary relaxation
 - Rigor mortis
 - secondary relaxation
 - cadaveric spasm.
95. The most favorable condition for development of mummification is.....
- hot and dry atmosphere
 - hot and moist atmosphere
 - body submerged in water
 - well ventilated room
96.has evidential value of antemortem origin indicating last act before death
- Cadaveric spasm
 - rigor mortis
 - heat stiffening
 - cold stiffening
97. Rigor mortis first appears in voluntary muscles of.....
- Neck
 - Eye
 - Heart
 - face
98. Rigor mortis develops in a foetus beyondintrauterine life.
- 180 days
 - 280 days
 - 210 days
 - 250 days
99. Cherry red coloured Post-mortem staining is seen in.....poisoning
- HCN
 - NaCN
 - KCN
 - CO
100. The rate of cooling in.....medium is maximum
- Body in coffin
 - Water
 - Grave
 - Air
101. Feather test is performed for confirmation of stoppage of function of.....
- Lungs
 - Heart
 - Brain
 - Liver
102. Which of the following is type of Autopsy?
- Clinical
 - Medicolegal
 - Both
 - None

103. Objectives for Autopsy are
A. To determine the cause of death
B. To determine identity of deceased.
C. To check the viability of foetus
D. All
104. Which of the following is pre requisite to perform Autopsy?
A. PIR
B. Dead Body Challan
C. Hospital record
D. All
105. Lacerations around lips and cheeks indicates
A. Gagging
B. Throttling
C. Bansdola
D. Burking
106. How many types of incisions are taken in Autopsy?
A. 3
B. 4
C. 10
D. 5
107. In deaths due to compression of neck..... is open first.
A. Abdomen
B. Neck
C. Head
D. Thorax
108. During Autopsy of spine and spinal cord, cord is removed by
A. Cutting the cord at regular intervals
B. By removing the cord along with the spine
C. Separating at foramen Magnum
D. Both A and B.
109. External examination of corpse shall be preferably
A. Head to toe
B. Toe to head
C. From right side
D. From left side
110. 'Y' shaped incision is taken as
A. Mastoid process to manubrium sterni
B. Thyroid cartilage to pubic symphysis
C. Anterior axillary fold to xiphisternum
D. From shoulders to manubrium sterni
111. Flattened contour of thorax is seen in corpse with
A. Petechial Haemorrhages
B. Fracture of ribs
C. Fracture of Sternum
D. Emphysema
112. Which of the following is not examined in the corpse where the death is due to compression of neck?
A. Hyoid bone
B. Digastric muscle
C. Thyroid cartilage
D. Carotids
113. Examination of the dead body is carried out in
A. Ultra violet light
B. Moonlight
C. Commercial lamps
D. Natural light
114. Clothes of corpse gives inference about
A. Occupation
B. Religion
C. Ethnicity
D. All
115. How many types of scorpion are present in India?
A. 98
B. 99
C. 100
D. 101
116. Toxicology includes
A. Biochemistry
B. Pathology
C. Pharmacology
D. All
117. Argemone seeds uses as adulterants in—
A. Oil
B. Ghee
C. Turmeric
D. Pepper

118. Most common food poisoning type is—
 A. Staphylococi
 B. Salmonellae
 C. E. Coli
 D. Listeria
119. Treatment for Salmonellae infection—
 A. Chloromphenicol
 B. Ambilillin
 C. Ciprofloxacin
 D. All
120. Brick powder is used as Adulterants in—
 A. Black pepper
 B. Chilly powder
 C. Turmeric powder
 D. None
121. Fujiwara test is used to detect—
 A. Cyanide
 B. Copper
 C. Ferous
 D. Cannabis
122. FSSAI is related to Food regulations in :
 A. Packaging and Labelling
 B. Toxins
 C. Contaminants
 D. All
123. Exposure to ionising radiation is which type of occupational hazard :
 A. Physical
 B. Chemical
 C. Biological
 D. Accidental
124. Raise awareness and education to worker in any occupation is which type of prevention in occupational hazards :
 A. Primary
 B. Secondary
 C. Tertiary
 D. None
125. A food allergy can cause :
 A. Tingling in mouth
 B. Hives
 C. Anaphylaxis
 D. All
126. Endocrine disrupters phthalates are found in :
 A. Electrical equipment
 B. Nail polish, hair spray, shampoo
 C. Furniture foam, carpet
 D. All
127. Human audible frequently range is :
 A. 20 Hz
 B. 15 Hz-20 KHz
 C. 20 KHz
 D. 20 Hz to 20 KHz
128. Smog is :
 A. Smoke + air
 B. Fog + air
 C. Smoke + ozone
 D. Smoke + fog
129. Smog can also contain :
 A. Nitrogen oxide
 B. Sulphur dioxide
 C. CO
 D. All
130. Choose the correct statement :
 A. CO, SO₂, CFC and NO are air pollutant.
 B. CFC destroy the earth's protective ozone layer which shields the earth from harmful UV rays.
 C. CFCs are gases used in things as aerosols and refrigerator's.
 D. All of the above
131. Which of the following is called the secondary air pollutant
 A. PANS
 B. Ozone
 C. CO
 D. Nitrogen dioxide
132. Which of the following agent is responsible for turning the Taj Mahal yellow
 A. Sulphur
 B. Chlorine
 C. Sulphur dioxide
 D. Nitrogen dioxide

133. Which of the following statement is true about air quality index
A. It indicates the colour of air
B. It predicts ozone level in specific area
C. It determines the intensity of sound and sound pollution
D. It estimates sulphur content in air
134. The major photochemical smog is
A. Hydrogen peroxide
B. CFC
C. Peroxyacetyl nitrate
D. All of above
135. Which of the following diseases are caused by smog
A. Rickets
B. Bronchitis
C. Breathing problems
D. All
136. Which gas is more in percentage in air
A. O₂ B. N₂
C. CO₂ D. Water vapour
137. What is the total percentage of Nitrogen gas in air
A. 12% B. 21%
C. 87% D. 78%
138. Which of the following gases are called greenhouse gases
A. Methane B. Nitrogen
C. CO₂ D. Both A & C
139. Which of the following are primary causes of water pollution
A. Plants B. Animals
C. Human activities D. None
140. Which salts is main cause of permanent hardness of water
A. Magnesium sulphate
B. Magnesium bicarbonate
C. Magnesium carbonate
D. None
141. Appearance of faint white lines on teeth is due to
A. Fluorosis
B. Toothaches
C. Long disease
D. Intestinal infection
142. Which of the following is a water borne disease
A. Typhoid B. Cholera
C. Diarrhoea D. All
143. The main cause of Arsenic in water are
A. Floods
B. Fertilizers
C. Industrial waste
D. Both B and C
144. Cadmium may causes :
A. Lung Ca B. Leukemia
C. Prostate Ca D. All
145. Arsenic may causes :
A. Lung Ca B. Leukemia
C. Prostate Ca D. All
146. Cigarette smoking is carcinogen for
A. Lung Ca B. Leukemia
C. Prostate Ca D. All
147. What is the function of forensic medicine
A. to investigate the crime
B. Age estimation
C. part of preventive public health
D. All
148. Forensic report is necessary for
A. Police investigation
B. Consent verification
C. Suspected death
D. All
149. Medical Jurisprudence deals with
A. Legal aspects of medicine
B. Medical aspects of law
C. Effect of violence on body
D. Medical law as IPC

150. NCISM established in which year
 A. 2018 B. 2019
 C. 2020 D. 2021
151. The function of NCISM is
 A. To provide medical education system that improves access to quality and affordable medical education.
 B. To ensure availability of adequate and high-quality medical professionals of Indian System of Medicine in all parts of the country.
 C. To promote equitable and universal healthcare that encourages community health perspective and makes services of such medical professionals accessible and affordable to all the citizens.
 D. All of the above
152. Which one is not the Rights and Privilege of Medical practitioner
 A. To practice medicine
 B. To choose patient
 C. To prescribe/dispense medicines
 D. To create discrimination between patient
153. Which one is not comes under right and privileges of patients
 A. To demand for the medical record.
 B. To perform surgical operation
 C. To complain and rectification of grievances.
 D. To obtain compensation for medical injuries or negligence.
154. PCPNDT act come in existence on
 A. 1990 B. 1994
 C. 2001 D. 2004
155. Inquest is
 A. Official process to find out how somebody died,
 B. A judicial inquiry to ascertain the fact,
 C. A discussion to something that happened
 D. All of above
156. Type of inquest is
 A. 2 B. 3
 C. 4 D. 5
157. Which inquest is indicated in death in police custody or death due to police firing
 A. Police inquest
 B. Magistrate inquest
 C. Coroners inquest
 D. Medical examiner system
158. Type of evidence are
 A. 2 B. 3
 C. 4 D. 5
159. Dying declaration is the type of
 A. Written evidence
 B. Oral evidence
 C. Circumstantial evidence
 D. All
160. Which evidence is most important in court
 A. Written
 B. Oral
 C. Circumstantial
 D. Heresay
161. Which one is considered as evidence when doctor attend the court to testify the fact under oath
 A. Medical certificates
 B. Medical reports
 C. Oral evidence
 D. Circumstantial evidence
162. Suicidal note, fingers print, foot print etc. are
 A. Oral evidence
 B. Circumstantial evidence
 C. Dying declaration
 D. All
163. Who can volunteer a statement
 A. Common witness
 B. Expert witness
 C. Hostile witness
 D. Eye witness

164. Highest Judicial tribunal in India In
A. Presidents court
B. Rajya Sabha
C. Lok Sabha
D. Supreme court
165. Corpus delicti is
A. body of offence
B. essence of crime
C. fact of any criminal offence include body of victim
D. All of above
166. Physical difference in male from female body
A. Shoulder broader than hip
B. Waist well defined
C. Thyroid less prominent
D. All of above
167. Which one is used for DNA profiling
A. Blood
B. Semen
C. Sliva & hair
D. All
168. The last deciduous tooth to erupt is
A. Canine
B. Lateral incisor
C. First molar
D. Second molar
169. Tanner staging is used to estimate the age in
A. Child
B. Pubertal
C. Post-pubertal
D. All
170. In pubertal and post-pubertal age estimation is done by
A. Tanner staging
B. Radiographic investigation
C. Finger prints
D. All
171. Forensic odontology used as forensic identify
A. Injury
B. To identify race
C. Religion
D. In mass disasters
172. Incorrect statement for Dactylography
A. Used to detect crime
B. Identical twins have same finger print
C. Remains permanent thought life
D. Unique epidermal ridge pattern
173. Age estimation in living is not done by
A. Skeletal estimation
B. Dental estimation
C. Social and psychological evaluation
D. Body implants
174. Thantology deals with
A. Study of death
B. Declaration of death
C. Certification of death
D. Organ transplantation
175. Match the correct Body cell Duration of die
A. Skin and bone 1. 3-7 minute
B. White blood cell 2. After somatic death
C. Cortical neuron 3. 12 hrs after cardiac arrest
- A. A-3, B-2, C-1 B. A-2, B-1, C-3
C. A-1, B-2, C-3 D. A-2, B-3, C-1

Answer of MCQ

1. C	2. D	3. B	4. C	5. C
6. A	7. C	8. C	9. C	10. A
11. C	12. A	13. B	14. A	15. B
16. C	17. C	18. C	19. A	20. A
21. B	22. A	23. B	24. D	25. C
26. B	27. C	28. A	29. B	30. B
31. B	32. C	33. C	34. C	35. C
36. B	37. A	38. D	39. B	40. A
41. C	42. B	43. A	44. D	45. A
46. B	47. B	48. C	49. B	50. A
51. D	52. C	53. B	54. A	55. B
56. A	57. D	58. B	59. C	60. A
61. B	62. D	63. D	64. D	65. B
66. C	67. D	68. D	69. D	70. A
71. D	72. B	73. A	74. D	75. A
76. C	77. C	78. A	79. D	80. A
81. B	82. D	83. C	84. A	85. D
86. A	87. A	88. A	89. A	90. A
91. C	92. C	93. B	94. B	95. A
96. A	97. B	98. C	99. A	100. B
101. A	102. C	103. D	104. D	105. A
106. B	107. C	108. C	109. A	110. D
111. C	112. B	113. D	114. D	115. B
116. D	117. A	118. B	119. D	120. B
121. A	122. D	123. A	124. B	125. D
126. B	127. D	128. D	129. D	130. B
131. C	132. B	133. B	134. D	135. D
136. B	137. D	138. D	139. C	140. A
141. A	142. D	143. D	144. C	145. A
146. A	147. D	148. D	149. A	150. C
151. D	152. D	153. B	154. B	155. D
156. C	157. B	158. B	159. A	160. B
161. B	162. B	163. B	164. D	165. D
166. A	167. D	168. D	169. A	170. B
171. D	172. B	173. D	174. A	175. D

Important MCQ

1. Which one is not a early sign of death
 - A. Rigor mortis
 - B. Adipocere
 - C. Colling of body
 - D. Post-mortem lividity
2. Which one is a mode of death
 - A. Coma
 - B. Asphaxia
 - C. Syncope
 - D. All
3. Sudden death occurs in
 - A. Electrocution
 - B. Drowning
 - C. Sunstroke
 - D. All
4. Cellular death found As
 - A. Immediate signs
 - B. Early signs
 - C. Late signs
 - D. All
5. Which test is not done for confirmation of cessation of respiration
 - A. Feather test
 - B. Mirror test
 - C. Magnus test
 - D. Winslow'S test
6. Which test is not indicated for confirming cessation of circulation
 - A. Magnus test
 - B. Diaphanous test
 - C. Finger nail test
 - D. Mirror test
7. Which one is not the early sign death
 - A. Algor mortis
 - B. Livor mortis
 - C. Abolition of pupillary and corneal reflex
 - D. Cadaveric spasm
8. Rigor mortis occurs in
 - A. Striated muscle
 - B. Smooth muscle
 - C. Cardiac muscle
 - D. All sort of muscles
9. Delayed onset of rigor mortis occurs in
 - A. Asphaxia
 - B. Cold environment
 - C. Hypothermia
 - D. All
10. Time since death can be estimated by
 - A. Rigor mortis
 - B. Cadaveric spasm
 - C. Adipocere
 - D. Livor mortis
11. Which one indicate that person was alive at the time of instantaneous rigor
 - A. Rigor mortis
 - B. Cadaveric spasm
 - C. Adipocere
 - D. Livor mortis
12. Use of death certificates is
 - A. For disposal of body
 - B. For insurance purpose
 - C. For succession of property
 - D. All
13. Registration of birth and death is done by
 - A. Gram panchayat
 - B. Municipality
 - C. Municipal corporation
 - D. All
14. Unearthing a buried individual is called
 - A. Autopsy
 - B. Exhumation
 - C. Adipocere
 - D. Skeletization

15. THOTA is related to
 - A. Organ transplant
 - B. Dowry death
 - C. Mass disaster
 - D. Autopsy
16. Mode of death, when a person trapped in a well is
 - A. Coma
 - B. Asphyxia
 - C. Syncope
 - D. All
17. Mechanical cause of asphyxia is
 - A. Hanging
 - B. Strangulation
 - C. Suffocation
 - D. All
18. Ligature that encircles the neck is
 - A. Hanging
 - B. Strangulation
 - C. Suffocation
 - D. All
19. Cause of death in hanging is
 - A. Cerebral ischemia
 - B. Cerebral congestion
 - C. Neurogenic shock
 - D. All
20. Ligature mark above thyroid cartilage found in
 - A. Hanging
 - B. Strangulation
 - C. Suffocation
 - D. All
21. Lynching is
 - A. Homicidal hanging
 - B. Accused is killed by group
 - C. Accused may be hanged by rope
 - D. All
22. Hyoid fracture is more common in
 - A. Hanging
 - B. Strangulation
 - C. Suffocation
 - D. All
23. Chocking by preventing air entry through mouth and nostril by filling piece of cloth in mouth is called
 - A. Gagging
 - B. Burking
 - C. Cafe coronary
 - D. All
24. Gettler test is done for
 - A. Hanging
 - B. Strangulation
 - C. Drowning
 - D. All
25. Gettler test estimate
 - A. Chloride content of blood
 - B. CO amount in blood
 - C. Diatoms presence
 - D. All
26. Sign of struggle and violence present in
 - A. Suicidal drowning
 - B. Homicidal drowning
 - C. Accidental drowning
 - D. All
27. Accidental chocking by bolus of food obstructing larynx is called as
 - A. Burking
 - B. Cafe coronary
 - C. Chocking
 - D. Smothering
28. Half open eyes with dilated pupil are found in
 - A. Drowning
 - B. Hanging
 - C. Suffocation
 - D. None
29. Which of the following is blunt force injury
 - A. Abrasion
 - B. Contusion
 - C. Laceration
 - D. All
30. Which one is not a thermal injury
 - A. Frost bite
 - B. Trench foot
 - C. Stab wound
 - D. Immersion foot

31. Motor tyre mark or radiator grill mark over skin in vehicular accident cases is
- Imprint abrasion
 - Pressure abrasion
 - Graze abrasion
 - Linear abrasion
32. Extravasation or collection of blood due to rupture of blood vessel by mechanical force is called
- Confusion
 - Ecchymosis
 - Laceration
 - Chop wound
33. Which one is correct for incised wound
- Always broader than edge of weapon
 - Length of wound is greater than width
 - More haemorrhage
 - All of above
34. Piercing wound formed by narrow or pointed object is
- Chop wound
 - Stab wound
 - Incised wound
 - All
35. Four wheelers motor vehicle injury might have
- Sparrow foot marks
 - Hinge fracture
 - Ladder tears
 - All
36. Whiplash injury is found in
- Motor cycle injuries
 - Car injuries
 - Gun shoot injuries
 - All
37. Degree of burn is classified
- 2
 - 4
 - 6
 - 10
38. In adult, burn % for the genitalia is
- 6%
 - 9%
 - 4%
 - 1%
39. Cause of immediate death in burns are
- Neurogenic shock
 - Hypovolemic shock
 - Suffocation due to CO
 - All of above
40. Kunkel's test is related to
- Detection of CO in blood
 - Fracture
 - Burn
 - Injury
41. Commonest cause of death in electric burn is
- Ventricular fibrillation
 - Electric burn is shock
 - Cerebral anoxia
 - All
42. Persistent inability to develop penile erection sufficient for coitus, called
- Impotence
 - Sterility
 - Sterilization
 - All
43. Inability of a person to procreate is called
- Impotence
 - Sterility
 - Sterilization
 - All
44. Criminal abortion is dealt under section of IPC
- 312
 - 316
 - 319
 - 312 to 316
45. Spaulding's sign (Skull become over ride each other) found in
- Still born
 - Dead born
 - Abortion
 - All
46. A child suffers repetitive physical injuries inflicted by parent or guardian is called
- Battered baby
 - Caffey's syndrome
 - Child abuse syndrome
 - All

7. Child born after the death of his biological father is called
 - A. Posthumous child
 - B. Suppositious child
 - C. Superfetation
 - D. All
8. MTP act launched in India at :
 - A. 1970
 - B. 1971
 - C. 1990
 - D. 1991
9. MTP amendment bill passed in :
 - A. 2010
 - B. 2012
 - C. 2020
 - D. 2015
10. As per MTP amendment bill 2020, MTP can be performed by the advice of two medical practioners upto :
 - A. 12 weeks
 - B. 20 weeks
 - C. 24 weeks
 - D. None
51. PCPNDT act is related with:
 - A. To stop female foeticide
 - B. To prevent misuse of prenatal sex selection diagnosis
 - C. Punishment of imprisoned for upto 3 years and fined Rs. 10,000. If any person doing sex determination diagnosis.
 - D. All of above
52. Rape is to be said
 - A. Against women will
 - B. Without her consent
 - C. With consent but age less than 16 yrs.
 - D. All of above
53. If police officer or hospital staff do rape is called
 - A. Custodial rape
 - B. Date rape
 - C. Gange rape
 - D. All
54. Sign for rape may be
 - A. Sign for struggle on cloth
 - B. Presence of semen in vagina
 - C. Presence of spermatozoa in vagina
 - D. All of above
55. Sexual intercourse through anus is called
 - A. Sadomy
 - B. Lust
 - C. Masochism
 - D. Masturbation
56. What is the age of victim in POSCO Act
 - A. Below 12 yr
 - B. Below 16 yr
 - C. Below 22 yr
 - D. Below 18 yr
57. Lucid interval is seen in
 - A. Anxiety
 - B. Dementia
 - C. Insanity
 - D. Shock
58. The scientific study of human mind and its function and behaviour is
 - A. Psychology
 - B. Psychiatry
 - C. Ethology
 - D. Sociology
59. MC Naughten rule is for
 - A. Criminal responsibility of insane
 - B. Criminal responsibility of sane
 - C. Civil responsibility
 - D. Civil responsibility of sane
60. When accused is not responsible for the Act, if his Act is resulted from mental illness, stated for
 - A. Currens rule
 - B. MC Naughten rule
 - C. Durhan rule
 - D. All
61. Mental health care Act was passed in India on
 - A. 2011
 - B. 2015
 - C. 2013
 - D. 2017
62. Forensic science is
 - A. Application of scientific methods and technique for purpose of justice
 - B. Application of scientific methods and technique for purpose of Law
 - C. Application of scientific methods and technique for purpose for police investigation
 - D. Application of scientific methods and technique for purpose of in criminal investigation

63. First forensic science Lab in India was established at
A. Kolkata B. Delhi
C. Mumbai D. Agra
64. In polygraphy, graph indicate the change in
A. Blood pressure B. Pulse rate
C. Skin resistance D. All
65. Participation and presence of a medical doctor is mandatory in which of the following
A. Brain mapping
B. Narcoanalysis
C. DNA analysis
D. Anthropometry
66. Which drug is used in Narcoanalysis
A. Sodium narcol
B. Sodium amylate
C. Sodium pentothal
D. Amphetamine
67. NDPS act prohibit Narcotic drug or Psychotropic substance to a person to
A. Produce/manufacture/cultivate
B. Possess/store
C. Sell/purchase/treatment
D. All
68. The quantity of Ganja quoted under section 27 of NDPS out for punishment to a person is
A. 50 gm B. 100 gm
C. 500 gm D. 1000 gm
69. Sale of noxious food or drink is comes under section of IPC
A. Section 272 IPC
B. Section 273 IPC
C. Section 274 IPC
D. Section 275 IPC
70. Drug and cosmetic act was established in
A. 1940 B. 1945
C. 1950 D. 1954
71. The Drugs and Magic remedies act was established
A. 1940
B. 1945
C. 1950
D. 1954
72. Which schedule of drugs and cosmetics rules have list of poisonous substances under Ayurvedic, Siddha and Unani system
A. Schedule C
B. Schedule E
C. Schedule F
D. Schedule G
73. Clinical establishment Act came in existence
A. 2004
B. 2009
C. 2010
D. 2017
74. Misbehaviour with duty Doctor, Nurse, Ward boy or other staff comes under IPC punishment for
A. 6 month imprisonment
B. 1 Yr imprisonment
C. 2 yr imprisonment
D. None
75. Attack on duty doctor, IPC 332, 333 gives punishment for imprisonment of
A. 1 Yr
B. 6 month
C. 3 month
D. 1-10 Years
76. Employees state insurance Act 1948 cover
A. Medical benefit
B. Maternity benefit
C. Disablement benefit
D. All of above

Answers of MCQ

1. B	2. D	3. D	4. B	5. C
6. D	7. D	8. D	9. D	10. A
11. B	12. D	13. D	14. B	15. A
16. B	17. D	18. A	19. D	20. A
21. D	22. B	23. A	24. C	25. A
26. B	27. B	28. A	29. D	30. C
31. A	32. A	33. D	34. B	35. D
36. B	37. C	38. D	39. D	40. A
41. A	42. A	43. B	44. D	45. B
46. D	47. A	48. B	49. C	50. C
51. D	52. D	53. A	54. D	55. A
56. D	57. C	58. A	59. A	60. C
61. D	62. A	63. A	64. D	65. B
66. C	67. D	68. C	69. B	70. A
71. D	72. B	73. C	74. C	75. D
76. D				

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About The Book

The present book is basically intended for the Under Graduate students of Ayurveda studying in 2nd Professional B.A.M.S. Arrangement of chapter in this text book of Agada Tantra Evam Vidhi Vaidyaka according to Course Curriculum for Second Professional BAMS (Prescribed By NCISM). Important references for Bruhatrayis and Laghutrayis and relevant books have been collected. Book covered all the syllabus topics like Concept of Agada Tantra, Visha Chikitsa, Vishakta Ahara Pariksha and Viruddha Ahara, Gara Visha and Dushi Visha, Visha Upadrava, Environmental Toxicology, Dermatological manifestations of Visha, Therapeutic utility of Agada Yoga, Sthavara Visha, Jangama Visha, Kritrima Visha, Substances of abuse, Agada Tantra perspectives on Cancer, Forensic Medicine and medical jurisprudence, Vaidya Sadvritta, Legal Procedures, Personal identity, Thanatology, Asphyxial deaths, Injury, Pregnancy, delivery and abortion, Sexual offences, forensic psychiatry, Forensic science laboratory and laws, acts, Rules and regulations.

Highlighted all most all the concepts of Agada Tanta and Vidhi Vaidyaka in a simple language with illustration of tables, chart, and images

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